

## EXHIBIT 3

IW 8032483

**THE UNITED STATES OF AMERICA**

**TO ALL TO WHOM THESE PRESENTS SHALL COME;**

**UNITED STATES DEPARTMENT OF COMMERCE**

**United States Patent and Trademark Office**

**January 31, 2020**

**THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE  
RECORDS OF THIS OFFICE OF THE FILE WRAPPER AND CONTENTS  
OF:**

**APPLICATION NUMBER: 15/862,016**

**FILING DATE: January 04, 2018**

**PATENT NUMBER: 10,028,740**

**ISSUE DATE: July 24, 2018**

**By Authority of the  
Under Secretary of Commerce for Intellectual Property  
and Director of the United States Patent and Trademark Office**



*Sylvia Holley*  
**SYLVIA HOLLEY**  
Certifying Officer

**JOINT EXHIBIT**

**JTX-011**

**Case No. 1:16-cv-00570-RGA**



January 4, 2018

Attorney Docket No.: 45335-0013002

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Street Address  
Fish & Richardson P.C.  
3200 RBC Plaza  
60 South Sixth Street  
Minneapolis, MN 55402

Mail Address  
P.O. Box 1022  
Minneapolis, MN 55440-1022  
612 335 5070 main  
877 769 7945 fax

Presented for filing is a new continuation patent application for prioritized examination of:

Inventor(s): NATHAN C. MOSKOWITZ, MOSHEH T. MOSKOWITZ AND AHMNON D. MOSKOWITZ

Title: HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

Enclosed are the following papers, including those required to receive a filing date under 37 CFR 1.53(b):

	<u>Pages</u>
Specification	21
Claims	1
Abstract	1
Drawing(s)	33

Enclosures:

- Application Data Sheet, 9 pages.
- Power of Attorney, 2 pages.
- Certification and Request for Prioritized Examination (Track I), 2 page

The applicant claims small entity status under 37 CFR 1.27.

Basic Filing Fee	\$70
Search Fee	\$300
Examination Fee	\$360

fr.com

**Commissioner for Patents**

January 4, 2018

Publication fee		\$0
Track I processing fee		\$70
Track I prioritized examination fee		\$2000
Total Claims 20	over 20	0 x \$40
Independent Claims 2	over 3	0 x \$210
Fee for Multiple Dependent claims		\$0
Application size fee for each 50 pages over 100		
	Total Sheets: 56x .75 - 100/50 = 0x	\$0
Surcharge for late filing fee, search fee, examination fee or oath or declaration		\$70
Total Filing fee		\$2870

The total filing fee is being paid concurrently on the Electronic Filing System (EFS) by deposit account authorization. Apply any other required fees or any credits to Deposit Account No. 06-1050, referencing the attorney docket number shown above.

I hereby authorize the USPTO to communicate in response to email communications from the undersigned and practitioners under Customer No. 26191 in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via email. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03).

If this application is considered to be incomplete, or if a telephone conference would otherwise be helpful, call the undersigned at (612) 337-2538.

Send all correspondence to:

26191  
Customer Number

Respectfully submitted,

/Stuart A. Nelson/

Stuart A. Nelson

Registration No. 63,947





**Commissioner for Patents**  
January 4, 2018

Enclosures  
SWN/aur  
61614449.doc

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	45335-0013002
		Application Number	
Title of Invention	HORIZONTAL-TRANVERSEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

**Secrecy Order 37 CFR 5.2:**

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

**Inventor Information:**

<b>Inventor 1</b>					<a href="#">Remove</a>				
<b>Legal Name</b>									
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>					
	Nathan	C.	Moskowitz						
<b>Residence Information (Select One)</b>					<input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
<b>City</b>	Rockville	<b>State/Province</b>	MD	<b>Country of Residence</b>	US				
<b>Mailing Address of Inventor:</b>									
<b>Address 1</b>	212 North Adams Street								
<b>Address 2</b>									
<b>City</b>	Rockville	<b>State/Province</b>	MD						
<b>Postal Code</b>	20850	<b>Country</b>	US						
<b>Inventor 2</b>					<a href="#">Remove</a>				
<b>Legal Name</b>									
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>					
	Mosheh	T.	Moskowitz						
<b>Residence Information (Select One)</b>					<input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
<b>City</b>	Rockville	<b>State/Province</b>	MD	<b>Country of Residence</b>	US				
<b>Mailing Address of Inventor:</b>									
<b>Address 1</b>	212 North Adams Street								
<b>Address 2</b>									
<b>City</b>	Rockville	<b>State/Province</b>	MD						
<b>Postal Code</b>	20850	<b>Country</b>	US						
<b>Inventor 3</b>					<a href="#">Remove</a>				
<b>Legal Name</b>									
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>					
	Ahmnon	D.	Moskowitz						
<b>Residence Information (Select One)</b>					<input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				

PTO/AIA/14 (11-15)

Approved for use through 04/30/2017. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number		45335-0013002	
		Application Number			
Title of Invention	HORIZONTAL-TRANSVERSE BRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION				
City	Rockville	State/Province	MD	Country of Residence	US
<b>Mailing Address of Inventor:</b>					
Address 1	212 North Adams St.				
Address 2					
City	Rockville	State/Province	MD		
Postal Code	20850	Country	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					<input type="button" value="Add"/>

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	26191		
Email Address	apsi@fr.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

**Application Information:**

Title of the Invention	HORIZONTAL-TRANSVERSE BRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		
Attorney Docket Number	45335-0013002	Small Entity Status Claimed <input checked="" type="checkbox"/>	
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	33	Suggested Figure for Publication (if any)	

**Filing By Reference:**

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

**Publication Information:**

<input type="checkbox"/> Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/> <b>Request Not to Publish.</b> I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application <b>has not and will not</b> be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	45335-0013002
		Application Number	
Title of Invention	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	26191		

**Domestic Benefit/National Stage Information:**

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	<a href="#">Remove</a>			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	12957776	2010-12-01		
Prior Application Status	Patented	<a href="#">Remove</a>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12957776	Continuation in part of	12471340	2009-05-22	8734516	2014-05-27
Prior Application Status	Patented	<a href="#">Remove</a>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12471340	Continuation in part of	12054335	2008-03-24	7972363	2011-07-05
Prior Application Status	Patented	<a href="#">Remove</a>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12054335	Continuation in part of	11842855	2007-08-21	7942903	2011-05-17
Prior Application Status	Patented	<a href="#">Remove</a>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
11842855	Continuation in part of	11536815	2006-09-29	7846188	2010-12-07

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number		45335-0013002	
		Application Number			
Title of Invention	HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION				

Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
11536815	Continuation in part of	11208644	2005-08-23	7704279	2010-04-27
Prior Application Status		Expired		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12957776	Claims benefit of provisional	60670231	2005-04-12		
Prior Application Status		Expired		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12957776	Claims benefit of provisional	61265752	2009-12-01		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					Add

**Foreign Priority Information:**

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)<sup>i</sup> the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country <sup>i</sup>	Filing Date (YYYY-MM-DD)	Access Code <sup>j</sup> (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			
Add			

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications**

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.



<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	45335-0013002
		Application Number	
Title of Invention	HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

## Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

**NOTE:** This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

### 1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

**A. Priority Document Exchange (PDX)** - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

**B. Search Results from U.S. Application to EPO** - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

### 2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

**NOTE:** Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	45335-0013002
		Application Number	
Title of Invention	HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

**Applicant Information:**

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

<b>Applicant</b>	1	<input type="button" value="Remove"/>		
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p> <p style="text-align: right;"><input type="button" value="Clear"/></p>				
<input checked="" type="radio"/> Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor		
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest		
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:				
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>				
Name of the Deceased or Legally Incapacitated Inventor: <div style="border: 1px solid black; width: 100%; height: 20px;"></div>				
If the Applicant is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Nathan	C.	Moskowitz	
<b>Mailing Address Information For Applicant:</b>				
Address 1		212 North Adams Street		
Address 2				
City	Rockville	State/Province	MD	
Country	US	Postal Code	20850	
Phone Number		Fax Number		
Email Address				
Additional Applicant Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

**Assignee Information including Non-Applicant Assignee Information:**

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	45335-0013002
		Application Number	
Title of Invention	HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

<b>Assignee</b> 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
				<input type="button" value="Remove"/>
If the Assignee or Non-Applicant Assignee is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Mailing Address Information For Assignee including Non-Applicant Assignee:</b>				
Address 1		<input type="text"/>		
Address 2		<input type="text"/>		
City	<input type="text"/>	State/Province	<input type="text"/>	
Country i	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>	Fax Number	<input type="text"/>	
Email Address		<input type="text"/>		
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				<input type="button" value="Add"/>

**Signature:**

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a juristic entity (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

<b>Signature</b>	/Stuart A. Nelson/		Date (YYYY-MM-DD)	2018-01-04
First Name	Stuart A.	Last Name	Nelson	Registration Number
				63,947
Additional Signature may be generated within this form by selecting the Add button.				<input type="button" value="Add"/>

PTO/AIA/14 (11-15)

Approved for use through 04/30/2017. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	45335-0013002
		Application Number	
Title of Invention	HORIZONTAL-TRANSVERSE BRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL  
FUSION**

**[0001]** This application is a Continuation-In-Part Application of co-pending Application Serial No. 12/471,340 filed on May 22, 2009, which is a Continuation-In-Part of co-pending Application Serial No. 12/054,335 filed on March 24, 2008, which is a Continuation-In-Part of Application Serial No. 11/842,855, filed on August 21, 2007, which is a Continuation-In-Part of Application Serial No. 11/536,815, filed on September 29, 2006, which is a Continuation-In-Part of Application Serial No. 11/208,644, filed on August 23, 2005, and this application also claims priority under 35 U.S.C. § 119(e) of U.S. Provisional Application No. 60/670,231, filed on April 12, 2005, and U.S. Provisional Application No. 61/265,752, filed on December 1, 2009; the entire contents of all of the above identified patent applications are hereby incorporated by reference in their entirety.

**FIELD OF DISCLOSURE**

**[0002]** The present invention relates to a unique universal horizontal-transverse curvilinear nail-screw (HTCN) and to a method of applying such an HTCN to the spine, whereby a series of NTCN's, according to the exemplary embodiments, can be implanted into adjacent vertebrae can be inter-connected with either rigid or flexible jointed rods, fusing two or more adjacent vertebral bodies together thereby achieving either rigid or flexible fusion, respectively, and thus obviating the need for pedicle screw fixation in many but not all cases. The exemplary embodiments also can be used to salvage and/or extend pre-existing pedicle screw fusions.

## BACKGROUND

[0003] The history and evolution of instrumented spinal fusion in the entire human spine has been reviewed in related applications Serial No. 12/054,335 filed on March 24, 2008, Serial No. 11/842,855, filed on August 21, 2007, Serial No. 11/536,815 filed on September 29, 2006, and Serial No. 11/208,644 filed on August 23, 2005, the contents of which are hereby incorporated by reference in their entirety. Conventionally, the majority of posterior and anterior spinal fusion surgical techniques are typically supplemented with the posterior placement of adjacent vertebral trans-pedicular screws.

[0004] Complications of pedicle screw placement in the spine include misplaced screws with neural and/or vascular injury, excessive blood loss, prolonged recovery, incomplete return to work, and excessive rigidity leading to adjacent segmental disease requiring further fusions and re-operations. Recent advances in pedicle screw fixation including minimally invasive, and stereotactic CT image-guided technology, imperfectly address some but not all of these issues.

## SUMMARY

[0005] The present invention recognizes the aforementioned problems with conventional apparatus and solves these problems.

[0006] Herein described are exemplary embodiments of novel HTCNs which are implanted and embedded within adjacent vertebral bodies using a lateral horizontal side-to-side-trajectory avoiding the pedicles entirely, and thereby avoiding all the risks associated with the placement of transpedicular vertebral screws. Direct non-trans-pedicular placement of HTCNs into the vertebral bodies, according to the exemplary embodiments, is possible because the HTCN is curved, and thus, can achieve horizontal transvertebral access, which is not possible by conventional straight screws/nails. Likewise, the inter-connection of HTCNs with either rigid rods, or multiple embodiments of jointed flexible rods, can achieve rigid or flexible fusion, respectively.



[0007] The exemplary embodiments of a Horizontal transvertebral curvilinear nails (HTCN) can provide a segmental vertebral spinal fusion having a strength that is equal to or greater than a strength of conventional pedicle screws without the complications arising from conventional pedicle screw placement, which include misplacement with potential nerve and/or vascular injury, violation of healthy facets, and possible pedicle destruction. By placing HTCNs horizontally across the vertebral body, and not into the vertebral bodies via the transpedicular route, thereby excluding the posterior spinal column, the exemplary embodiments can preserve healthy facet joints and pedicles. The exemplary embodiments of HTCNs are designed with predetermined curved angles to avoid laterally exiting nerve roots. Furthermore, with respect to patients who already have had pedicle screws, with concomitant pedicular destruction, placement of HTCNs according to the exemplary embodiments can be employed as a salvage procedure achieving segmental fixation without having to engage additional rostral and caudal vertebrae transpedicularly, unnecessarily lengthening a spinal fusion, and adding more operative risk per fused level.

[0008] Furthermore, as a result of the orientation and length of the HTCNs according to the exemplary embodiments, multiple level fusions can be easily performed.

[0009] For example, exemplary embodiments are directed to one or more HTCNs, one or more interconnecting rigid rods, and one or more interconnecting jointed flexible rods. The HTCN can include a nail/screw which is precurved in multiple angles (e.g., a plurality of predetermined angles), for example, that take into account a safe trajectory upon insertion into the lateral posterior vertebral body beneath the pedicle and spinal canal, through the transverse process (or lateral to it), whose entry point and trajectory avoids exiting/traversing nerve roots from the spinal canal. The connecting rod can include a solid rod which can achieve rigid fusion. The embodiments of the connecting rod can include one or more flexible rods. For example, the flexible rods can include side to side, or head to head ball-socket joints that can allow multiple degrees of freedom of movement. The exemplary embodiment of the rods can be locked onto rostral and caudal

vertebral HTCNs via locking mechanisms. In an exemplary embodiment, all of the rods can be locked onto rostral and caudal vertebral HTCNs via locking mechanisms.

[0010] Another exemplary embodiment is directed to a method of inserting a HTCN laterally into the vertebral body. The method can include, for example, either direct, fluoroscopic, or navigational image guidance visualization of the transverse process to determine the initial entry point through the transverse process (or lateral, caudal or cephalad to it), and its curvilinear trajectory to the vertebral, lateral, sub-pedicular, sub-canalicular lateral entry point into the vertebral body.

[0011] Exemplary methods of interlocking sequential HTCNs with rigid or jointed rods and their interlocking connectors are described herein. Once the surgeon is satisfied with the position and placement of the HTCNs either in unilateral or bilateral adjacent vertebral bodies, interconnecting rods that are either rigid, or jointed, can be attached and locked to the HTCNs achieving rigid or flexible fusion depending on the need of the patient and the choice of the surgeon.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0012] The accompanying drawings are presented to aid in the description of embodiments of the invention and are provided solely for illustration of the embodiments and not limitation thereof.

[0013] Figures 1A-H illustrate an exemplary embodiment of an HTCN solid-flat head embodiment I in lateral (Figure A), and en-face (Figure B) views, and lateral views of an exemplary embodiment of a threaded screw cap embodiment II (Figure C), an exemplary embodiment of a threaded nail body embodiment III (Figure D), an exemplary embodiment of a fish-hooked tail embodiment IV (Figures E and F), and an exemplary embodiment of a threaded tail/screw embodiment V (Figures G and H).

[0014] Figures 2A-D illustrate exemplary embodiments of an HTCN, embodiments (I-V), inserted bilaterally into two adjacent transparent vertebral bodies in top-oblique (Fig A), lateral (Figure B), axial (Figure C) and top (Figure D) views.

[0015] Figures 3A-D illustrate exemplary embodiments of an HTC�, embodiments (I-V), inserted bilaterally into two adjacent non-transparent vertebral bodies in top-oblique (Fig A), lateral (Figure B), axial (Figure C) and top (Figure D) views.

[0016] Figure 4A illustrates exemplary embodiments of a rigid connecting rod-HTCN construct (Embodiment I) inserted bilaterally into two adjacent vertebral bodies in the superior oblique view

[0017] Figure 4B illustrates an exploded view of the rigid connecting rod-HTCN construct (Embodiment I) of Figure 4A.

[0018] Figures 4C, D and E illustrate lateral (Figure C), axial (Figure D), and top (Figure E) view of exemplary embodiments of a rigid connecting rod-HTCN construct (Embodiment I) inserted bilaterally into two adjacent vertebral bodies.

[0019] Figure 5A illustrates exemplary embodiments of a ball-socket, side-side jointed connecting rod-HTCN construct (Embodiment II) in the superior- oblique view.

[0020] Figure 5B illustrates an exploded view of the ball-socket, side-side jointed connecting rod-HTCN construct (Embodiment II) of Figure 5A.

[0021] Figures 6A-D illustrate superior-oblique (Figure A), lateral (Figure B), axial (Figure C), and top (Figure D) view of exemplary embodiments of a ball-socket, side-side jointed connecting rod-HTCN construct inserted bilaterally into two adjacent vertebral bodies.

[0022] Figure 7A illustrates exemplary embodiments of a ball- socket, head-head, jointed connecting rod-HTCN construct (Embodiment III) in the superior oblique view.

[0023] Figure 7B illustrates an exploded view of the ball-socket, head-head jointed connecting rod-HTCN construct (Embodiment III) of Figure 7A.

[0024] Figures 8A-D illustrate the superior-oblique (Figure A), lateral (Figure B), axial (Figure C), and top (Figure D) views of exemplary embodiments of a ball-socket, head-head jointed connecting rod-HTCN construct inserted bilaterally into two adjacent vertebral bodies.

**DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS  
OF THE INVENTION**

[0025] Aspects of the invention are disclosed in the following description and related drawings directed to specific embodiments of the invention. Alternate embodiments may be devised without departing from the scope of the invention. Additionally, well-known elements of the invention will not be described in detail or will be omitted so as not to obscure the relevant details of the invention.

[0026] The word “exemplary” is used herein to mean “serving as an example, instance, or illustration.” Any embodiment described herein as “exemplary” is not necessarily to be construed as preferred or advantageous over other embodiments. Likewise, the term “embodiments of the invention” does not require that all embodiments of the invention include the discussed feature, advantage or mode of operation.

[0027] With reference to FIGS. 1A-8D, exemplary embodiments of the invention will now be described.

[0028] 1. THE MEDICAL DEVICE

[0029] Referring to FIGS. 1A-8D, the above described problems of the conventional art can be solved in the spine by horizontal transvertebral insertion into adjacent vertebral bodies either unilateral or bilateral HTCN-interconnecting rigid or flexible jointed connecting constructs according to the exemplary embodiments, thereby achieving rigid or flexible vertebral fusion/fixation.

[0030] For example, Figures 1A-H illustrate three-dimensional views of five different exemplary embodiments of a single HTCN which can be horizontally inserted unilaterally into a single vertebra.

[0031] Figures 1A-B illustrate an exemplary embodiment of a solid flat-head HTCN 10 (embodiment I). The HTCN 10 can include a single piece construct manufactured out of any type of bio-compatible material. The HTCN 10 can include a body 12 having a

sharp pointed tip 14 and a head 16. The HTCEN 10 can include a geometry that is curvilinear, allowing its sharp pointed tip 14 to be posteriorly or laterally, or anteriorly introduced, and to penetrate the mid lateral aspect of a vertebral body. The head 16 can include a flat head that provides a surface which can be tamped upon by any variety of instruments in order to insert the pointed tip 14 (e.g., tail portion) and a portion of the body 12 into the core of the vertebral body. In this example, the orientation of the HTCEN 10 within the vertebral body is horizontal, as opposed to trans-pedicular. Hence, the exemplary embodiment allows a non-pedicular based posterior, lateral or anterior vertebral fusion.

[0032] Figure 1C illustrates an exemplary embodiment of an HTCEN 10 having a threaded screw cap 16 (embodiment II). In this embodiment, the geometry of the HTCEN 10 can be identical to the embodiment I described above. Rather than being one solid piece, the exemplary HTCEN 10 can include two separate pieces or portions, such as a) a screw cap 16a, and b) the HTCEN body 12 and portion (e.g., tail portion) with a pointed tip 14. The superior flat headed surface 16 of the HTCEN 10 can include a central threaded perforation or opening 16b into which a threaded screw portion 17 of the cap 16a can be secured by threaded engagement or screwed into. The screw cap 16a can secure the HTCEN 10 to the interconnecting rod locking devices (described in greater detail below).

[0033] Figure 1D illustrates an exemplary embodiment of an HTCEN 10 having a body 12 includes a threaded head or portion 16d (embodiment III). In this embodiment, the upper outer surface of the head 16d is threaded to accept a screw cap 16c having internal corresponding threading. The HTCEN 10 according to this embodiment can function similar to the embodiment II described above.

[0034] Figures 1E and F illustrate an exemplary embodiment of an HTCEN 10 including a fish-hooked tail or portion 18 (embodiment IV). In this embodiment, the tail 18 of the HTCEN 10 can include a series of radially arranged fish-hooks 20 to engage the cancellous core of the vertebral body. Figure 1F is an enlargement illustrating details of an exemplary embodiment of the radial fish-hook 18.

[0035] Figures 1G and H illustrate an exemplary embodiment of an HTCEN 10 including a threaded tail-screw 22 (embodiment V). The threaded tail 22 can include threads 24 that can engage the cancellous core of the vertebral body. Figure 1H is an enlargement illustrating details of an exemplary embodiment the threads 24.

[0036] Other variations and embodiments of the HTCEN 10 can include any other type of mechanism that allows insertion and immobility of the HTCEN 10 into and within the vertebral body (bodies).

[0037] The angle and geometric configuration of the HTCEN 10 also can be altered or varied in multiple manners. The HTCEN 10 also can be manufactured in varying sizes with respect to length and width providing a selection from which to choose to address different sized vertebral bodies in the same and /or different patients.

[0038] Figures 2A-D exemplarily illustrate the placement of a total of four HTCENs 10 into two adjacent transparent vertebral bodies in order to achieve their fusion, according to an exemplary method. A first HTCEN 10 is inserted unilaterally into the right transparent vertebral body, a second HTCEN 10 is inserted unilaterally into the left transparent vertebral body, a third HTCEN 10 is inserted into the adjacent right transparent vertebral body, and a fourth HTCEN 10 is inserted into the adjacent left transparent vertebral body. Two of the HTCENs 10 are lined up on the right, and two of the HTCENs 10 are lined up on the left. The initiating path of the curvilinear HTCENs 10 may begin posteriorly, laterally, or anteriorly, and the trajectory of the HTCEN 10, for example, in all cases, is horizontal from its mid-lateral vertebral entry point to its final destination which is the relative inner center of the vertebral body. The HTCENs 10 are seen perforating the transverse processes. This is the estimated trajectory orientation for avoiding (e.g., necessary to avoid) exiting nerve roots. The entry point of the HTCEN can be more medial, lateral, caudal or rostral to the transverse process. The initial position of insertion may be via a posterior, lateral or surgical approaches.

[0039] Figures 2A-D are transparent in order to appreciate the necessary HTCEN trajectory, its position and orientation within the vertebrae, its entry point into the mid lateral vertebrae (Figure 2B) and its starting and destination points.



[0040] Figures 3A-D exemplarily illustrate the placement of a total of four HTCNS 10 into two adjacent non-transparent vertebral bodies 100 in order to achieve fusion of these two adjacent bodies. A first HTCNS 10 is inserted unilaterally into the right non-transparent vertebral body 100, a second HTCNS 10 is inserted unilaterally into the left non-transparent vertebral body 100, a third HTCNS 100 is inserted into the adjacent right non-transparent vertebral body 100, and a fourth HTCNS 10 is inserted into the adjacent left non-transparent vertebral body 100. In the exemplary embodiment illustrated in Figures 3A-D, two of the HTCNSs 10 are lined up on the right, and two of the HTCNSs 10 are lined up on the left. The path of the curvilinear HTCNSs 10 begins posteriorly, and its trajectory is horizontal from its entry point into the mid lateral vertebral body 100 to its final destination which is the relative center of the vertebral body 100.

[0041] The HTCNSs 100 are illustrated as perforating the transverse processes 102. Figures 3A-D illustrate an example of an estimated trajectory and orientation for avoiding (e.g., necessary to avoid) exiting nerve roots. In other embodiments, the entry point of the HTCNS 10 can be more medial, lateral, caudal, or rostral to the transverse process 102. The initial position of insertion may be via posterior, lateral, or anterior surgical approaches.

[0042] Figures 3A-D exemplarily illustrate how the HTCNSs 10 may appear to the surgeon during a hypothetical operation.

[0043] Figures 4A-E exemplarily illustrate an example of a rigid connecting bar-HTCNS construct (Embodiment I) that can achieve rigid segmental fusion of two adjacent vertebral bodies 100. This exemplary embodiment can include two HTCNSs 10 coupled together. This connection can be rigid or fixed in at least one degree of movement, or more than one degree of movement. As illustrated in the exemplary embodiment, the HTCNSs 10 can be coupled together by a rigid HTCNS connecting bar 30, which can be threaded on either end, two connecting bar links 32, which can couple the bar 30 to each of the two HTCNSs 10, and two tightening nuts 34 on the outsides of the connecting bar links 32, which can secure the connecting bar links 32 and bar 30 to the HTCNSs 10. The connecting bar link 32 can include a first (upper) perforation (e.g., opening, through-hole,

etc.) 39 that receives or engages a portion of the connecting bar 32, and a second (lower) perforation (e.g., opening, through-hole, etc.) 38 that receives or engages a portion of the HTCEN 10, such as the head 16 of the HTCEN 10. The HTCENs 10 are inserted into the second (lower) perforations 38 of the connecting bar link 32. In this manner, when the HTCENs 10 are secured to the vertebral bodies 100, each of the heads 16 of the HTCENs 10 is placed into a second (lower) perforation 38 of each of the two adjacent connecting bar links 32. This exemplary embodiment can include an HTCEN 10 according to any of the exemplary embodiments (I-V) described above, as well as other arrangements.

[0044] The threaded rigid HTCEN connecting bar 30 then can be implanted into the superior perforations (first or upper perforations) 39 of the connecting link 32 such that the threaded ends of the connecting bar 30 are disposed on the outside of the connecting links 32. A threaded tightening nut 34 can be secured to either or both ends of the connecting bar 30. In this manner, the exemplary embodiment can securely and effectively link two adjacent HTCENs 10 together in a rigid manner, thereby effectively achieving a rigid segmental fusion of two adjacent vertebrae.

[0045] Figures 4A-E exemplarily illustrate the implantation of these constructs into both the left and right sides of the spine.

[0046] The exemplary embodiment is illustrated with two HTCENs 10 per connecting bar 30. However, one of ordinary skill in the art will recognize that more than two HTCENs 10 can be coupled to each connecting bar 30. Furthermore, the threading on the connecting bar 30 is not limited to the illustrated embodiment and can extend along a portion or all of the length of the connecting bar 30. For example, in an alternative embodiment, three or more nuts 34 can be secured to the threaded connecting bar 30 to secure two or more connecting bar links 34 (e.g., three or four links 34, etc.) to the connecting bar 30, such that two or more HTCENs 10 (e.g., three or four HTCENs 10, etc.) can be coupled to the same connecting bar 30. The diameter of the connecting bar 30 is illustrated as being uniform along a length of the connecting bar 30. However, other embodiments are possible in which the diameter of the body of the connecting bar 30, the diameter of the threads, etc. can be different at different portions of the connecting bar

30. Other embodiments can include more than two connecting bar links 32, and more than two tightening nuts 34.

[0047] Figures 5A through 5B illustrate an exemplary embodiment of a plurality of HTCNs 10 coupled together with a flexible or movable connecting rod-HTCN construct (Embodiment II). For example, a ball and trough, side-side jointed connecting rod 40 can couple two or more HTCNs 10 together such that the HTCNs can move with respect to each other while being secured to each other. The connecting rod 40 can provide a flexible fusion or coupling (e.g., a movable coupling in at least one dimension) between the plurality of HTCNs 10.

[0048] In this embodiment, rather than using a horizontal rigid rod, such as the rod 30 in the embodiment illustrated in Figures 4A-E, the connecting rod 40 that connects two adjacent implanted HTCNs 10 can include two inter-locking components that allow for movement. The inter-locking components can include, for example: a) a first hemi-rod 44 having a distal end with a ball portion projecting from a side, and b) a second hemi-rod 42 having a distal end with an accepting trough (e.g. socket) projecting from its side. The first hemi-rod 44 can be coupled to the second hemi-rod 42 in a ball and socket manner.

[0049] The side to side interaction of the ball and trough components 44, 42 can provide a certain or predetermined degree of flexibility with motion or movement between the adjacent HTCNs 10 being coupled together. Hence, the exemplary embodiment can provide a flexible fusion or coupling between adjacent HTCNs 10.

[0050] This exemplary embodiment can include, for example, similar components as the embodiment I illustrated in Figures 4A-E. For example, two connecting bar links 32 and two or more tightening nuts 46 can be provided on either side of the two rod components 44, 42. The ends of the ball and trough rod components 44, 42 can be threaded 48 to receive or engage the nuts 46 to secure the connecting bar links 32 to the ball and trough rod components 44, 42, enable tightening of the constructs.

[0051] The connecting bar link 32 can include a first (superior, upper) perforation (e.g., opening, through-hole, etc.) 52 that receives or engages a portion of one of the rod

components 44, 42, and a second (inferior, lower) perforation (e.g., opening, through-hole, etc.) 50 that receives or engages a portion of the HTCEN 10, such as the head 16 of the HTCEN 10. The HTCENs 10 are inserted into the second (inferior, lower) perforations 50 of the connecting bar link 32. In this manner, when the HTCENs 10 are secured to the vertebral bodies 100, each of the heads 16 of the HTCENs 10 is placed into a second (lower) perforation 50 of each of the two adjacent connecting bar links 32. This exemplary embodiment can include an HTCEN 10 according to any of the exemplary embodiments (I-V) described above, as well as other arrangements.

**[0052]** The threaded portions or ends of each of the rod components 44, 42 can be inserted into the first (upper) perforations 52 of the connecting link 32 such that the threaded ends 48 of each of the rod components 44, 42 are disposed on the outside of the connecting links 32. A threaded tightening nut 46 can be secured to the end of each of the rod components 44, 42. In this manner, the exemplary embodiment can securely and effectively link two adjacent HTCENs 10 together in a flexible or moveable manner, thereby effectively achieving a flexible or moveable segmental fusion of two adjacent vertebrae.

**[0053]** Figures 6A-D exemplarily illustrate the ball and trough, side-side jointed connecting rod-HTCEN construct (Embodiment II) that can provide a flexible fusion inserted bilaterally into adjacent vertebral bodies of the spine. Any of the five disclosed exemplary embodiments of the HTCEN 10 (embodiments I-V), as well as other arrangements, may be selected for these constructs to insert into two adjacent vertebral bodies 100. Once this is done, the threaded, ball and trough, side-to-side jointed HTCEN connecting bar 40 (rod components 44, 42) then can be implanted into the superior perforations (upper perforations) 52 of the connecting link 32, with at least a part of the threaded portions 48 of the rod components 44, 42 protruding outside these connecting links 32. Then the threaded tightening nuts 46 can be secured to either threaded end 48 of the rod components 44, 42 of the connecting bar 40. This construct effectively links two adjacent HTCENs 10 together in a non-rigid manner, effectively achieving flexible segmental fusion of two adjacent vertebrae.

[0054] Figures 6A-D exemplarily illustrate the implantation of these constructs into both the left and right sides of the spine.

[0055] The exemplary embodiment is illustrated with two HTCNs 10 per connecting bar 40. However, in alternative embodiments, more than two HTCNs 10 can be coupled to each connecting bar 40. Furthermore, the threading 48 on the connecting bar 40 is not limited to the illustrated embodiment. For example, in an alternative embodiment, three or more nuts 34 can be secured to the threaded connecting bar 40 to secure two or more connecting bar links 34 (e.g., three or four links 34, etc.) to the connecting bar 40, such that two or more HTCNs 10 (e.g., three HTCNs 10) can be coupled to the same connecting bar 40. Other embodiments can include more than two connecting bar links 32, and more than two tightening nuts 34.

[0056] Figures 7A and B illustrate another exemplary embodiment of a plurality of HTCNs 10 coupled together with a ball and trough, head-to-head jointed connecting rod-HTCN construct (Embodiment III) to provide a flexible (or moveable) segmental fusion between the HTCNs 10.

[0057] For example, rather than using a horizontal rigid connecting rod 30, or a side-to-side ball and trough connecting rod 40, this exemplary embodiment includes a connecting rod 60 that connects two adjacent implanted HTCNs 10 and that includes two (a pair of) inter-locking components including, for example: a) a first hemi-rod 64 having a distal end including a ball projecting from its head, and b) a second hemi-rod 62 having a distal end including an accepting trough (or socket) projecting from its head.

[0058] This exemplary embodiment can include, for example, similar components as the embodiment I illustrated in Figures 4A-6D. The connecting rod 60 can include two connecting bar links 66 and two tightening nuts 70 on either side of the two rod components 64, 62 of the rod components 64, 62 of the connecting bar 60. The ends of the ball and trough head-head rod components 64, 62 can be threaded 68 to enable securing and tightening of the nuts 70 to the bar links 66, thereby securing the connecting bar links 66 to the ball and trough rod components 64, 62, enable tightening of the constructs.

[0059] The connecting bar link 66 can include a first (superior, upper) perforation (e.g., opening, through-hole, etc.) 74 that receives or engages a portion of one of the rod components 64, 62, and a second (inferior, lower) perforation (e.g., opening, through-hole, etc.) 72 that receives or engages a portion of the HTCEN 10, such as the head 16 of the HTCEN 10. The HTCENs 10 are inserted into the second (inferior, lower) perforations 72 of the connecting bar link 66. In this manner, when the HTCENs 10 are secured to the vertebral bodies 100, each of the heads 16 of the HTCENs 10 is placed into a second (lower) perforation 72 of each of the two adjacent connecting bar links 66. This exemplary embodiment can include an HTCEN 10 according to any of the exemplary embodiments (I-V) described above, as well as other arrangements.

[0060] The threaded portions or ends 68 of each of the rod components 64, 62 can be inserted into the first (upper) perforations 74 of the connecting link 66 such that at least a portion of the threaded ends 68 of each of the rod components 64, 62 are disposed on the outside of the connecting links 66. A threaded tightening nut 70 can be secured to the threaded end 68 of each of the rod components 64, 62. In this manner, the head-head to side interaction of the ball and trough can enable or provide a certain (or predetermined) degree of flexibility with respect to motion between two adjacent and secured HTCENs 10, and hence, can provide a flexible fusion.

[0061] Figures 8A-D illustrate an exemplary embodiment of the ball and trough, head-head jointed connecting rod-HTCEN construct (Embodiment III) that can provide a flexible fusion inserted bilaterally into the spine. Any of the five exemplary embodiments of the HTCEN 10 (I-V) illustrated in Figures 1A-3D, as well as other arrangements, may be selected for these constructs to insert into two adjacent vertebral bodies 100. Once this is done, the threaded ball and trough, head-head jointed HTCEN connecting bar 60 then can be implanted into the superior perforations 74 of the connecting link 66, with at least a portion of the threaded portion 68 of the rod components 64, 62 protruding outside the connecting links 66. Then, the threaded tightening nuts 70 can be secured to either threaded end 68 of the rod components 64, 62 of the connecting bar 60. This exemplary embodiment can provide a construct that



effectively links two adjacent HTCNS 10 together in a non-rigid manner, effectively achieving flexible segmental fusion of two adjacent vertebrae.

[0062] Figures 8A-D exemplarily illustrate the implantation of these constructs into both the left and right sides of the spine.

[0063] All of the exemplary embodiments can be made of any biocompatible material, and can be manufactured in different sizes. The HTCNS 10 can be coupled together with various other interconnecting devices that can be secured, either rigidly or non-rigidly, the HTCNS 10 together, and the embodiments are not limited to the exemplary embodiments illustrated in Figures 4A-8D.

[0064] 2. SURGICAL METHOD

[0065] With reference again to Figures 1A-8D, exemplary methods and surgical steps for practicing one or more of the foregoing exemplary embodiments will now be described.

[0066] In practice, the HTCNS 10 are surgically implanted into two or more adjacent vertebrae, either unilaterally or bilaterally (see, e.g., Figures 2 and 3). The HTCNS 10 can be inserted using posterior, lateral, or anterior approaches. The HTCNS 10 can be inserted posterior through midline, or par midline approaches through opened, closed, endoscopic, or tubular techniques with or without fluoroscopic monitoring, or any other form of image guidance. The HTCNS 10 can be inserted through a lateral or anterior approach in likewise manner.

[0067] The surgeon can select an HTCNS 10 according to any of the five HTCNS embodiments (I-V) described herein, as well as other arrangements, for implantation (e.g., see Figure 1 A-H). Once two or more HTCNS 10 are inserted either unilaterally or bilaterally into adjacent vertebral bodies, then the surgeon can choose to connect two or more HTCNS 10 using, for example, the exemplary rigid HTCNS connecting rod 30 for providing rigid segmental fusion (e.g., see Figure 4). Alternatively, the surgeon can choose to connect one or more HTCNS 10 using, for example, (a) a flexible connecting rod 40 to form a ball and trough, side to side, jointed flexible rod-HTCNS construct

(embodiment II, Figures 5 and 6), or (b) a flexible connecting rod 60 to form a ball and trough, head to head, jointed flexible rod-HTCN construct (embodiment III), Figures 7 and 8.

[0068] The surgical procedure performed when choosing the rigid rod-HTCN construct (Embodiment I) begins with implantation of the HTCNs 10 into the lateral vertebral body 100 (e.g., Figures 2 and 3). One of the five embodiments of HTCNs 10, or other arrangements, can be chosen (e.g., Figure 1A-H). Next, the HTCNs 10 can be tapped/screwed into the vertebral body 100 using a tamp and/or screw driver, or other suitable tool or device. Fluoroscopy/x-ray/image guidance can be used to confirm the entry point into the mid vertebral body, as well as the inner core mid-vertebral destination of the tapered end (pointed tip 14) of the HTCN 10. With posterior implantation, the pointed tip 14 of the HTCN 10 will often, but not necessarily always, traverse and perforate the transverse process (processes) 102 en route to its entry point into the mid-lateral vertebral body 100. Once two or more adjacent HTCNs 10 are successfully implanted into two adjacent vertebral bodies 100, then the heads 16 of the HTCN 10 can be placed into the inferior perforations 38 of two adjacent connecting bar links 32 (e.g., see Figures 4A-E).

[0069] The threaded rigid HTCN connecting bar 30 then can be inserted into the superior perforations 39 of the adjacent connecting bar links 32 with its threaded ends 36 protruding out of these links 32 (Figures 4A-E). Next, the threaded tightening nuts 34 can be secured to either threaded end 36 of the connecting bar 30. This construct effectively links two adjacent HTCNs 10 together in a rigid manner effectively achieving rigid fusion of two adjacent vertebrae. In other embodiments, the HTCN 10 can include a screw cap 16a, 16c that is fastened and tightened to a threaded portion 16b, 16d of the body 12 of the HTCN 10 to secure the head 16 of the HTCN to the inferior perforation 38 of the connecting rod link 32.

[0070] With reference to Figures 1A-3D and 5A-6D, exemplary methods and surgical steps for practicing one or more of the exemplary embodiments of flexible connecting bar constructs will now be described.

[0071] An example of a method or surgical procedure performed when choosing the flexible, ball and trough, side-side, rod-HTCN construct (Embodiment II) begins with implantation of the HTCNS 10 into the lateral vertebral body 100 (Figures 2 and 3). One of five exemplary embodiments of HTCNS 10, or other suitable arrangement, can be chosen (Figures 1A-H). Next, the HTCNS 10 can be tapped/screwed into the vertebral body 100 using a tamp and/or a screw driver, or other suitable tool or device. Fluoroscopy/x-ray/image guidance can be used to confirm the entry point into the mid vertebral body, as well as the ultimate inner core mid-vertebral destination of the tapered end (pointed tip 14) of the HTCNS 10. With posterior implantation, the pointed tip 14 of the HTCNS 10 will often, but not always, traverse and perforate the transverse process (processes) 102 en route to the entry point of the HTCNS 10 into the mid-lateral vertebral body 100. Other trajectories also can be used. Once two or more adjacent HTCNS 10 are successfully implanted into two adjacent vertebral bodies 100, then the heads 16 of the HTCNS 10 can be placed into the inferior perforations 50 of two adjacent connecting bar links 36 (e.g., see Figures 5 and 6).

[0072] The threaded flexible HTCNS connecting bar 40 is then inserted into the superior perforations 52 of the adjacent connecting bar links 32 with at least a portion of the threaded ends 48 protruding out of these links 32 (Figures 5 and 6). One hemi-rod (ball) 44 is inserted into one connecting link 32, and the other hemi-rod (trough) 42 is inserted into the adjacent connecting link 32. The placement of the ball 44 against the trough 42 can be optimized for flexibility. Next, the threaded tightening nuts 46 are secured to either of the threaded ends 48 of the rod components 44, 42 of the hemi-connecting bars 40. These exemplary constructs can effectively link two adjacent HTCNS 10 together in a flexible manner effectively achieving rigid fusion of two adjacent vertebrae. With respect to the HTCNS embodiments with screw caps 16a, 16c, once the construct is created, the screw caps 16a, 16c can be fastened and tightened to the superior ends 16b, 16d of the body 12 of the HTCNS 10 which protrude from outside the inferior perforations 50 of the connecting bar links 32, thereby securing the head 16 of the HTCNS 10 to the inferior perforation 50 of the connecting bar link 32.

[0073] With reference to Figures 1A-3D and 7A-8D, exemplary methods and surgical steps for practicing one or more of the exemplary embodiments of flexible connecting bar constructs will now be described.

[0074] An example of a method or surgical procedure performed when choosing the flexible, ball and trough, head-head, rod-HTCN construct (Embodiment III) begins with implantation of the HTCNs 10 into the lateral vertebral body 100 (Figures 2 and 3). One of five exemplary embodiments of HTCNs 10, or other suitable arrangements, can be chosen (Figures 1A-H). Next, the HTCNs 10 are tapped/screwed into the vertebral body 100 using a tamp and/or a screw driver, or other suitable tool or device. Fluoroscopy/x-ray/navigational image guidance can be used to confirm the entry point into the mid vertebral body, as well as the ultimate inner core mid-vertebral destination of the tapered end (pointed tip 14) of the HTCN 10. With posterior implantation, the pointed tip 14 of the HTCN 10 will often, but not always, traverse and perforate the transverse process (processes) 102 en route to its entry point into the mid-lateral vertebral body 100. Other trajectories also can be used. Once two or more adjacent HTCNs 10 are successfully implanted into two adjacent vertebral bodies 100, then the heads 16 of the HTCN 10 are placed into the inferior perforations 72 of two adjacent connecting bar links 66 (e.g., see Figures 7 and 8).

[0075] The threaded flexible HTCN connecting bar 60 is then inserted into the superior perforations 74 of the adjacent connecting bar links 66 with at least a portion of the threaded ends 68 protruding out of these links 66 (Figures 7 and 8). One hemi-rod (ball) 64 is inserted into one connecting link 66, and the other hemi-rod (trough) 62 is inserted into the adjacent connecting link 66. The placement of the ball 64 against the trough 62 can be optimized for flexibility. Next, the threaded tightening nuts 70 can be secured to either threaded end 48 of the rod components 64, 62 of the hemi-connecting bar 60. This exemplary construct can effectively link two adjacent HTCNs 10 together in a flexible manner effectively achieving flexible segmental fusion of two adjacent vertebrae. With respect to the HTCN embodiments with screw caps 16a, 16c, once the construct is created, the screw caps 16a, 16c can be fastened and tightened to the superior

ends 16c, 16d of the HTCNS 10 which protrude from outside the inferior perforations 72 of the connecting bar links 66, thereby securing the head 16 of the HTCNS 10 to the inferior perforation 72 of the connecting rod link 66.

[0076] The exemplary embodiments of the Horizontal Curvilinear Transvertebral Nail-screws (HTCNS) described herein can provide a segmental vertebral spinal fusion that has a strength that is equal to or greater than a strength provided by conventional pedicle screws without the complications arising from pedicle screw placement, which can include, for example, misplacement with potential nerve and/or vascular injury, violation of healthy facets, and possible pedicle destruction. By placing the exemplary HTCNS 10 horizontally across the vertebral body, and not into the vertebral bodies via the transpedicular route thereby excluding the posterior spinal column, then healthy facet joints and pedicles can be preserved. The exemplary HTCNS 10 can include predetermined curved angles to avoid laterally exiting nerve roots. Furthermore, with respect to patients who already have had pedicle screws, with concomitant pedicular destruction, the placement of the exemplary HTCNS 10 can be employed as a salvage procedure achieving segmental fixation without, for example, having to engage additional rostral and caudal vertebrae transpedicularly, unnecessarily lengthening a spinal fusion, and adding more operative risk per fused level.

[0077] Furthermore, because of the orientation and length of the exemplary HTCNS, multiple level fusions can be easily performed.

[0078] The present invention has been described herein in terms of several preferred embodiments. However, modifications and additions to these embodiments will become apparent to those of ordinary skill in the art upon a reading of the foregoing description. It is intended that all such modifications and additions comprise a part of the present invention to the extent that they fall within the scope of the several claims appended hereto.

[0079] Like numbers refer to like elements throughout. In the figures, the thickness of certain lines, layers, components, elements or features may be exaggerated for clarity.

[0080] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the specification and relevant art and should not be interpreted in an idealized or overly formal sense unless expressly so defined herein. Well-known functions or constructions may not be described in detail for brevity and/or clarity.

[0081] As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. As used herein, phrases such as "between X and Y" and "between about X and Y" should be interpreted to include X and Y. As used herein, phrases such as "between about X and Y" mean "between about X and about Y." As used herein, phrases such as "from about X to Y" mean "from about X to about Y."

[0082] It will be understood that when an element is referred to as being "on", "attached" to, "connected" to, "coupled" with, "contacting", etc., another element, it can be directly on, attached to, connected to, coupled with or contacting the other element or intervening elements may also be present. In contrast, when an element is referred to as being, for example, "directly on", "directly attached" to, "directly connected" to, "directly coupled" with or "directly contacting" another element, there are no intervening elements present. It will also be appreciated by those of skill in the art that references to a



structure or feature that is disposed "adjacent" another feature may have portions that overlap or underlie the adjacent feature.

[0083] Spatially relative terms, such as "under", "below", "lower", "over", "upper", "lateral", "left", "right" and the like, may be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is inverted, elements described as "under" or "beneath" other elements or features would then be oriented "over" the other elements or features. The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the descriptors of relative spatial relationships used herein interpreted accordingly.

**WHAT IS CLAIMED IS:**

1. A horizontal-transvertebral curvilinear nail-screw (HTCN) comprising:  
a body portion having a first end and a second end, wherein the first end is  
opposed to the second end; and  
a head at the first end of the body portion,  
wherein the body portion has a predetermined curvilinear shape and includes a  
pointed tip at the second end of the body portion.

## ABSTRACT

A horizontal-transvertebral curvilinear nail-screw (HTCN) including a body portion having a first end and a second end, wherein the first end is opposed to the second end; and a head at the first end of the body portion, wherein the body portion has a predetermined curvilinear shape and includes a pointed tip at the second end of the body portion, and a method of surgically implanting universal horizontal-transvertebral curvilinear nail-screws (HTCN) into a plurality of adjacent vertebrae.

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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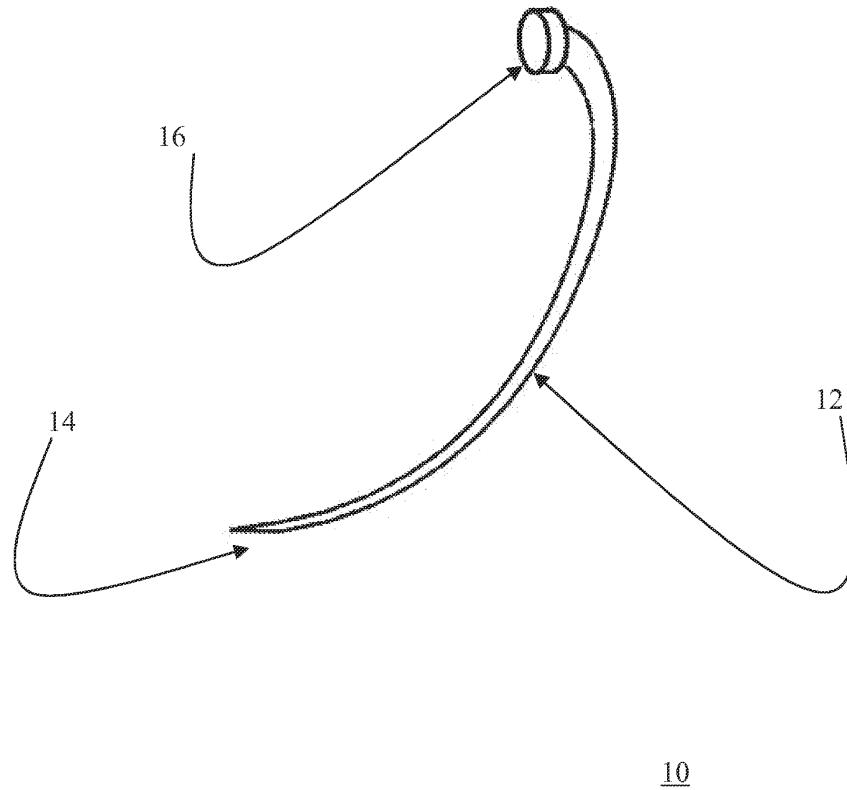


FIGURE 1A

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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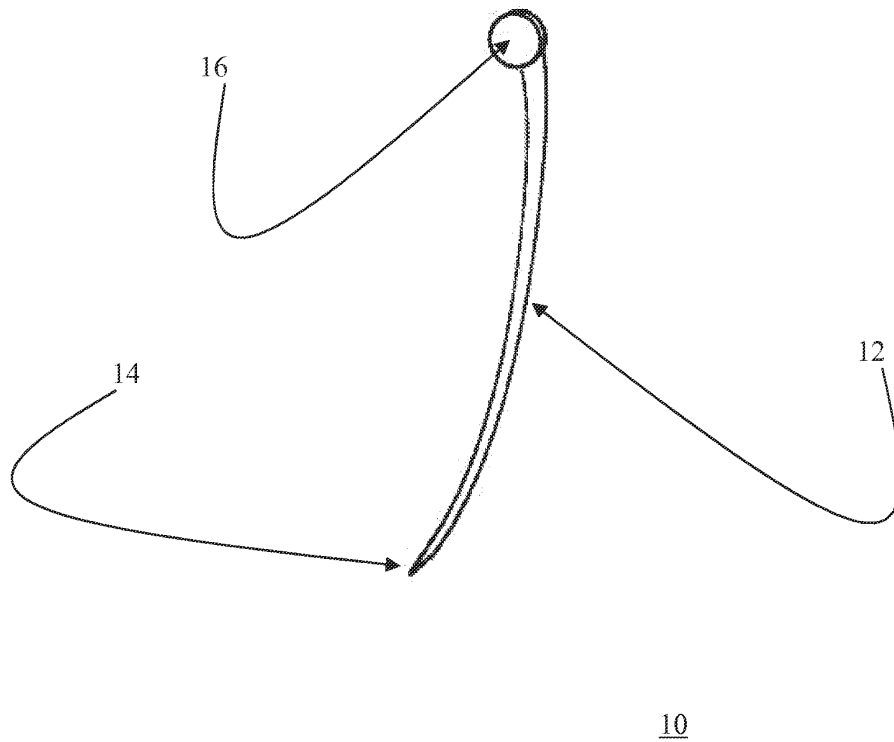


FIGURE 1B

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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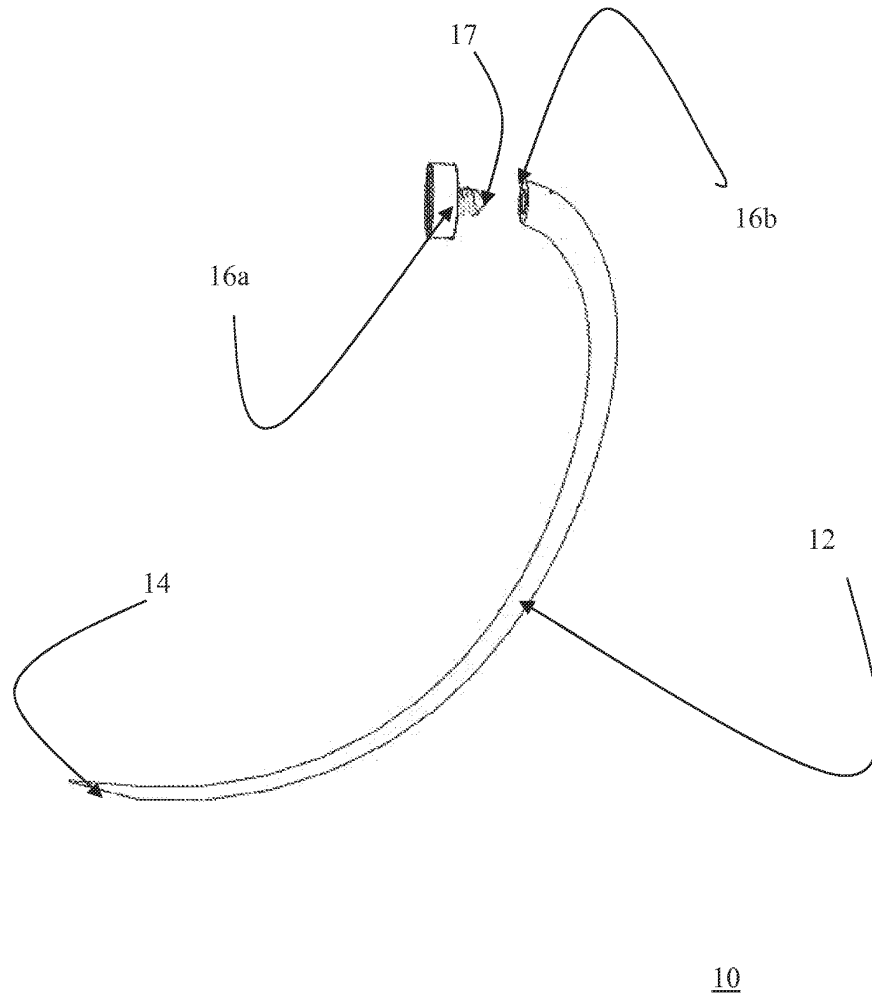


FIGURE 1C



Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRAL CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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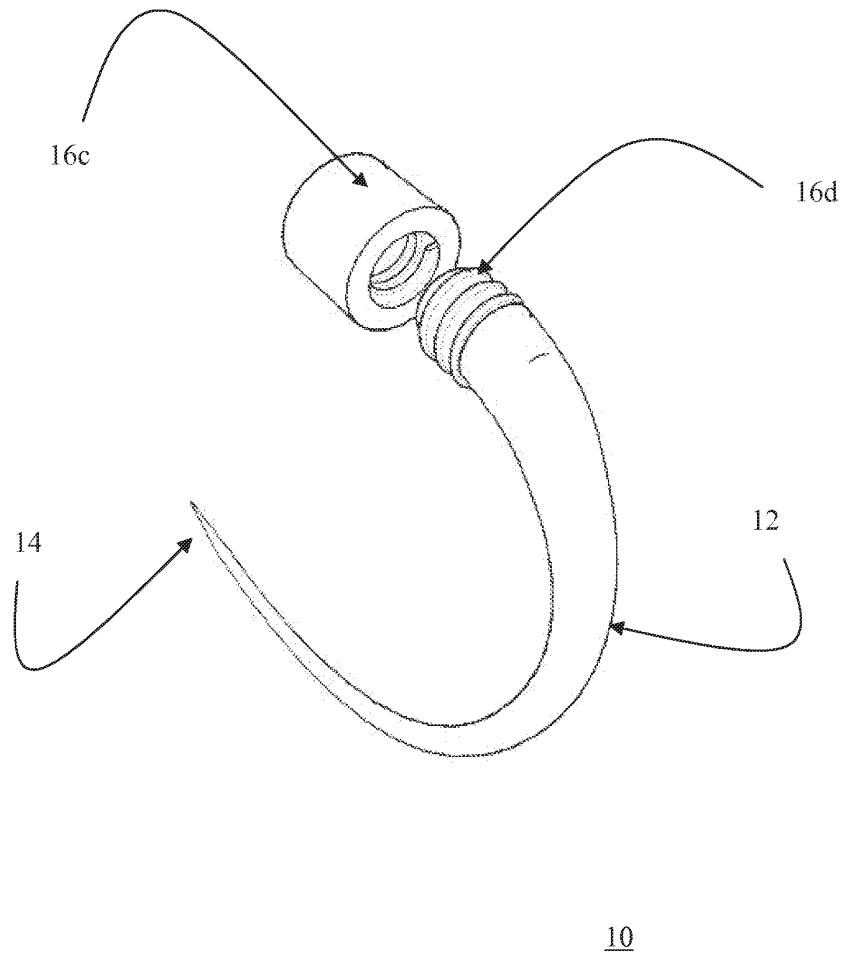


FIGURE 1D

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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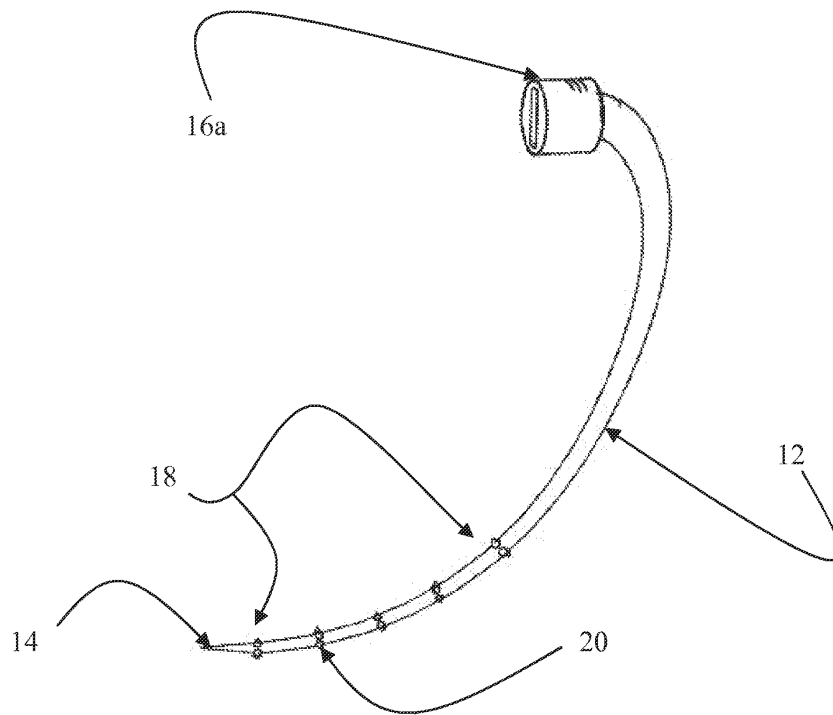


FIGURE 1E

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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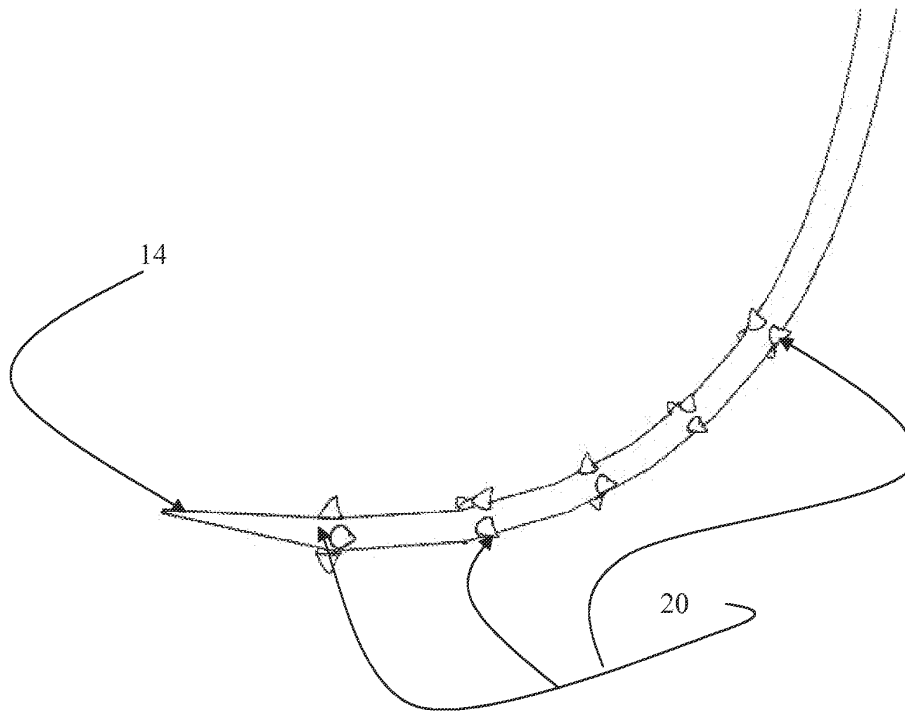


FIGURE 1F

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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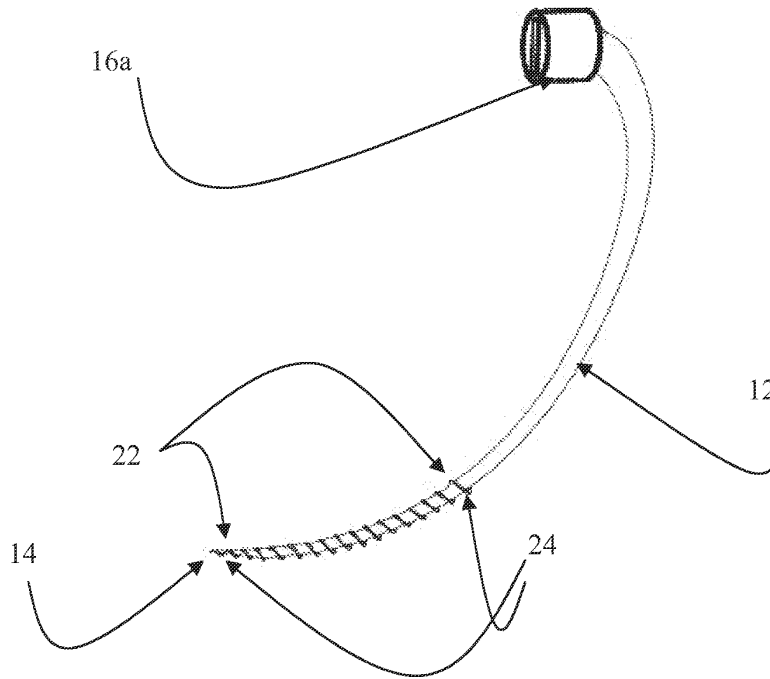


FIGURE 1G

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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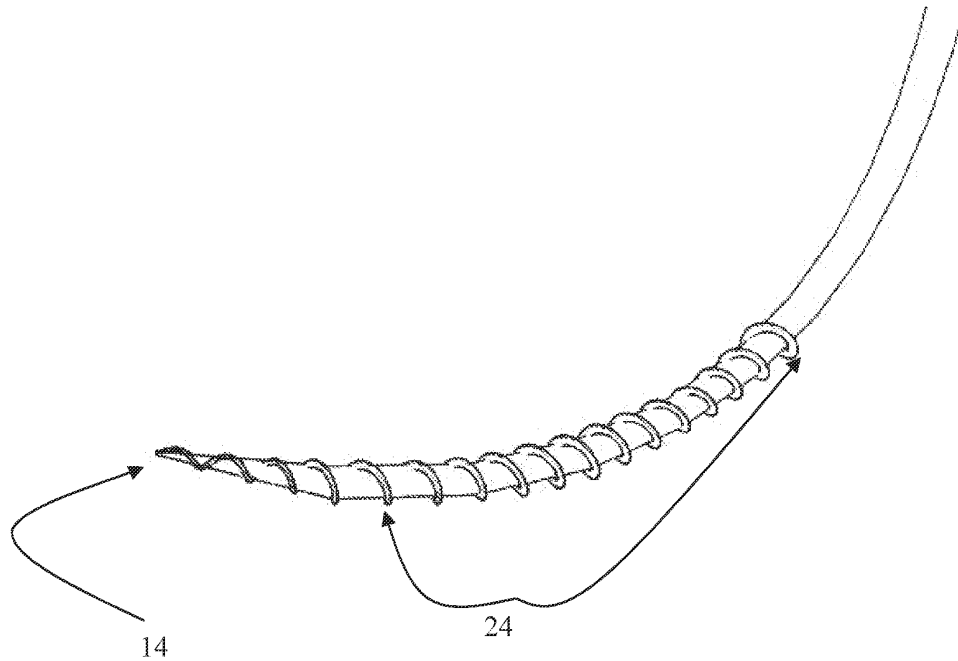


FIGURE 1H

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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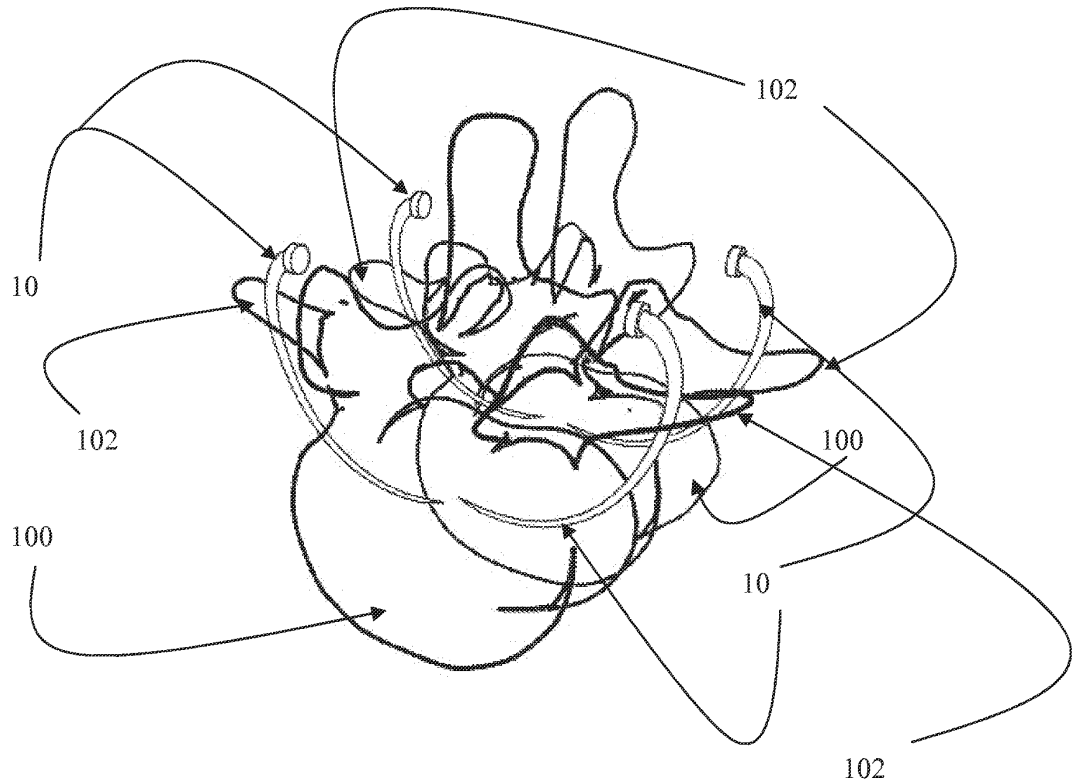


FIGURE 2A



Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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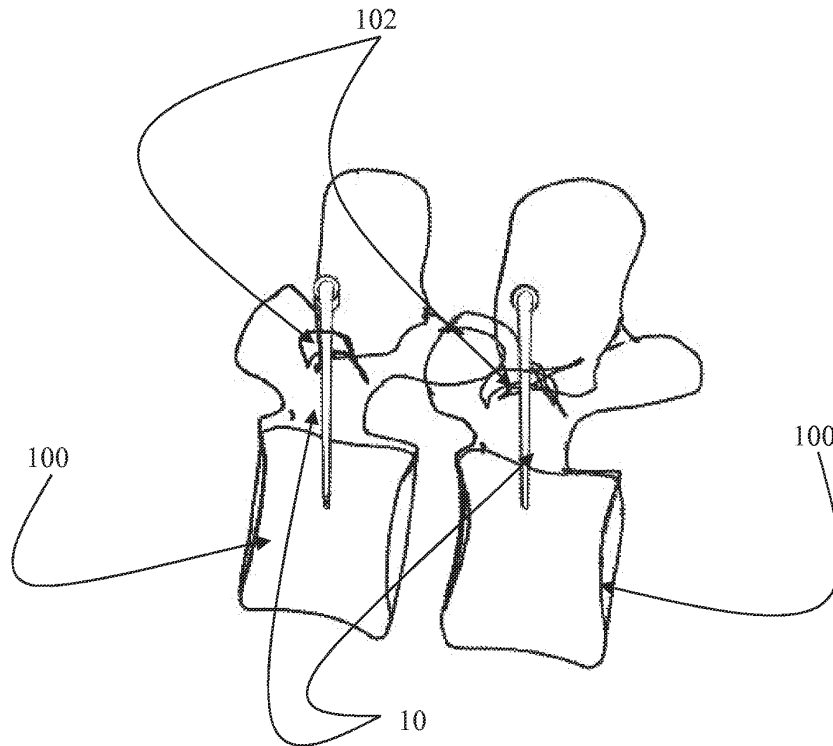


FIGURE 2B

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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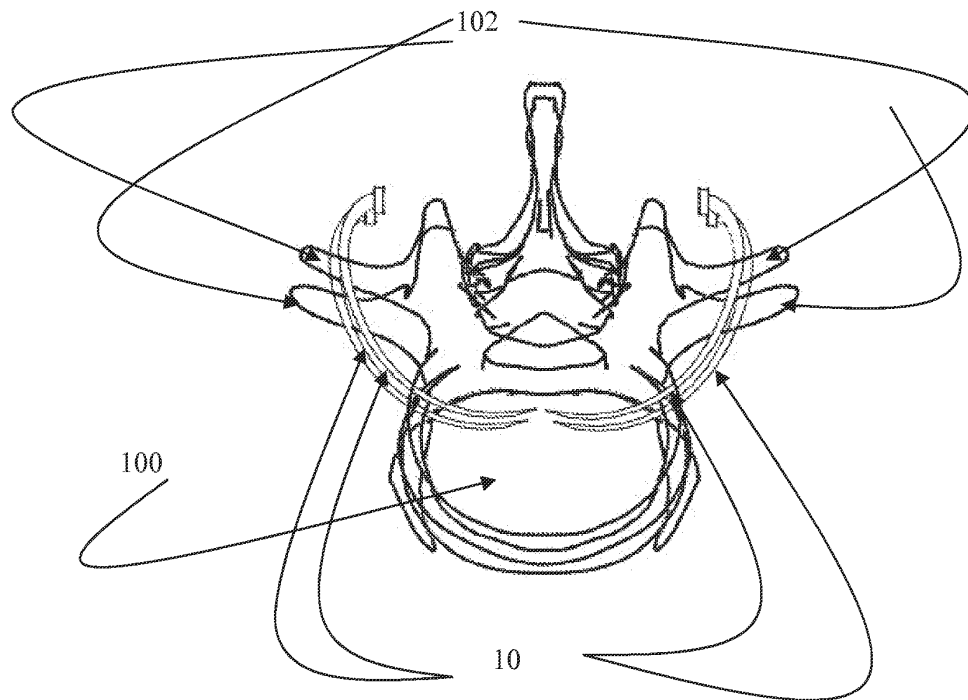


FIGURE 2C

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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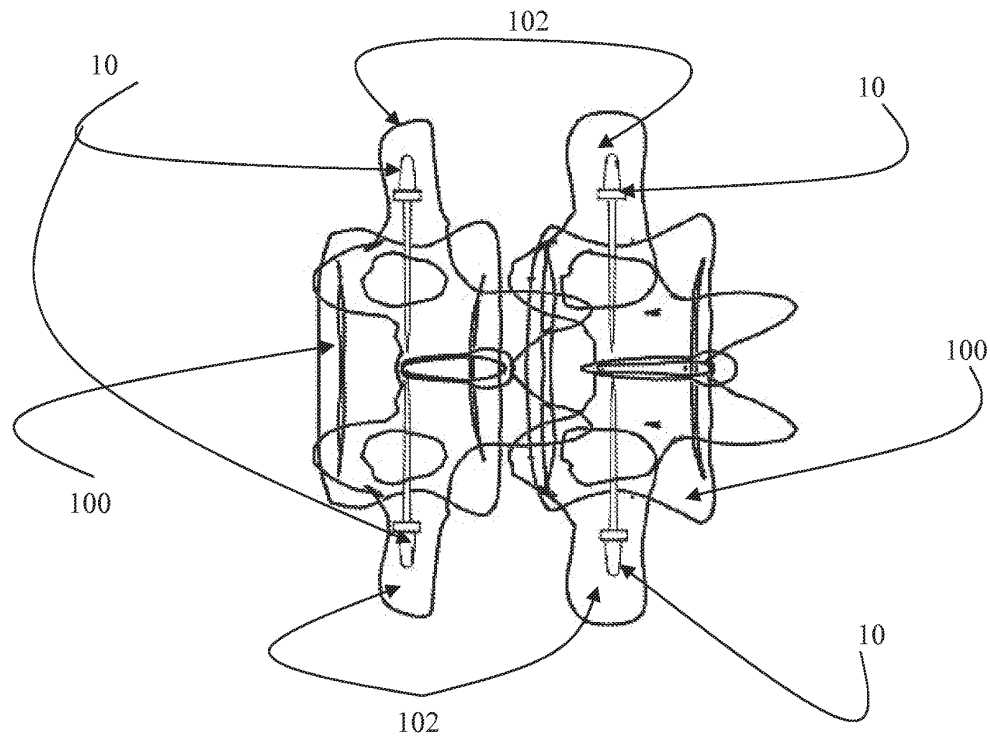


FIGURE 2D

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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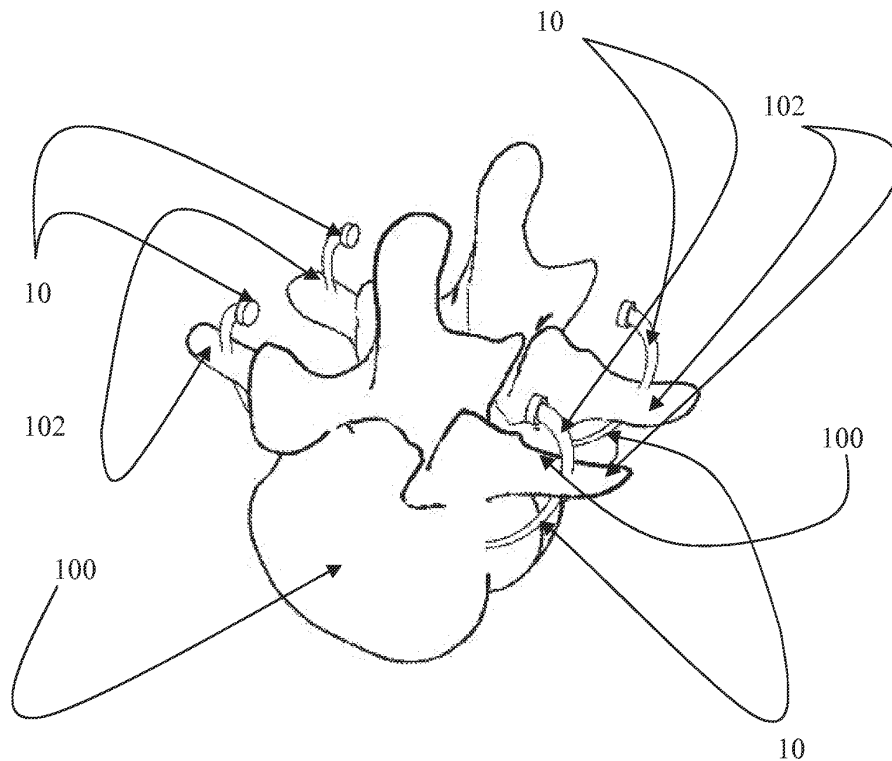


FIGURE 3A

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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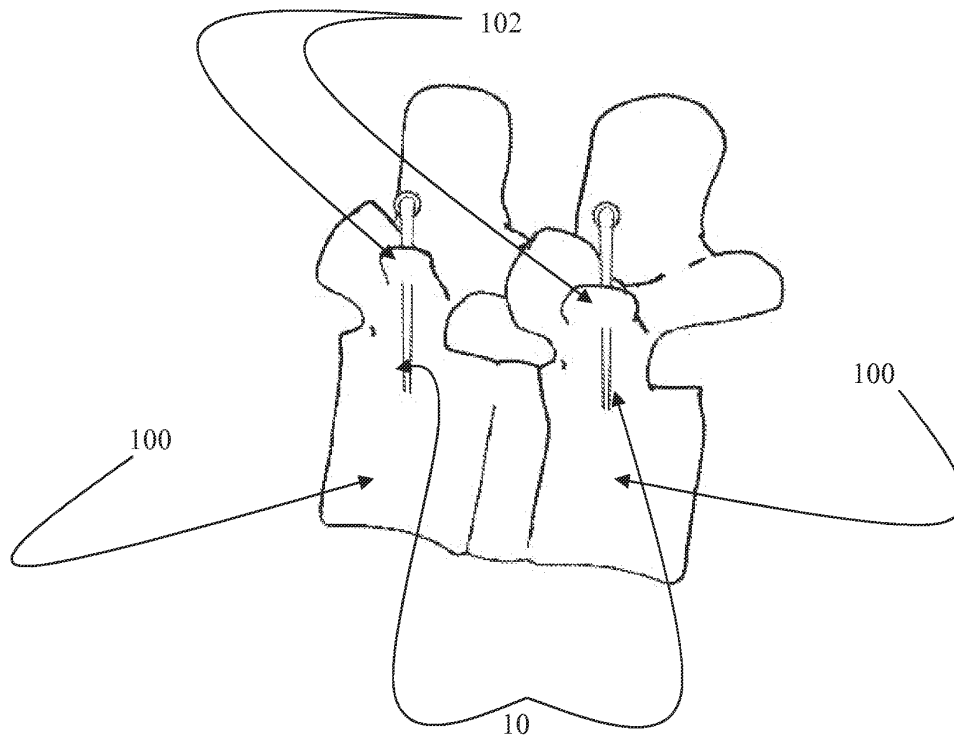


FIGURE 3B

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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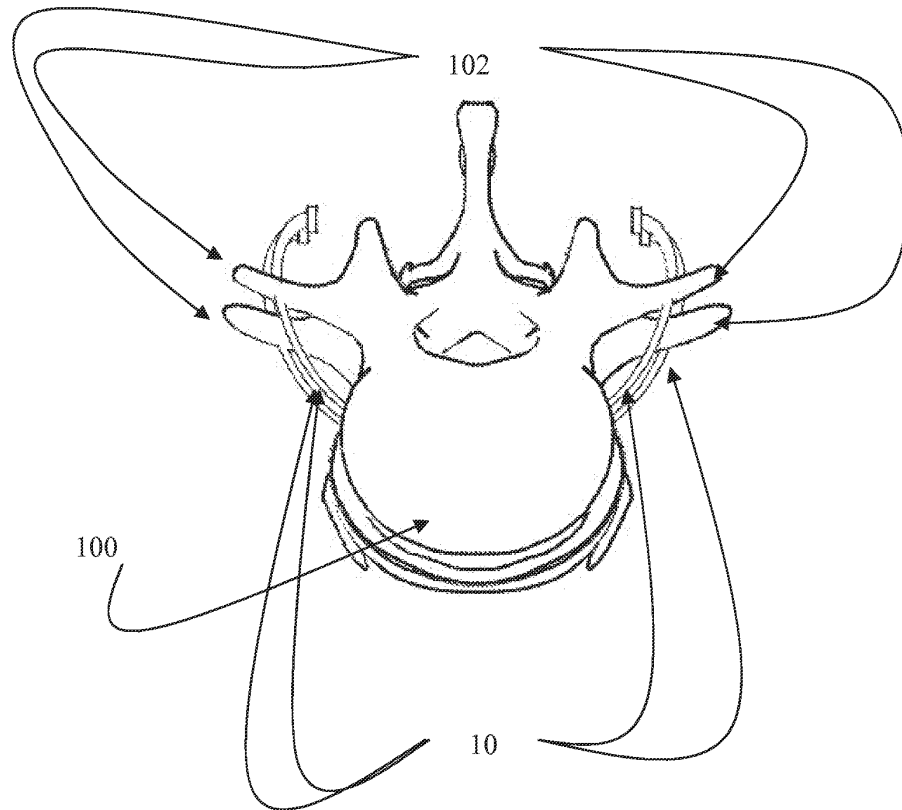


FIGURE 3C



Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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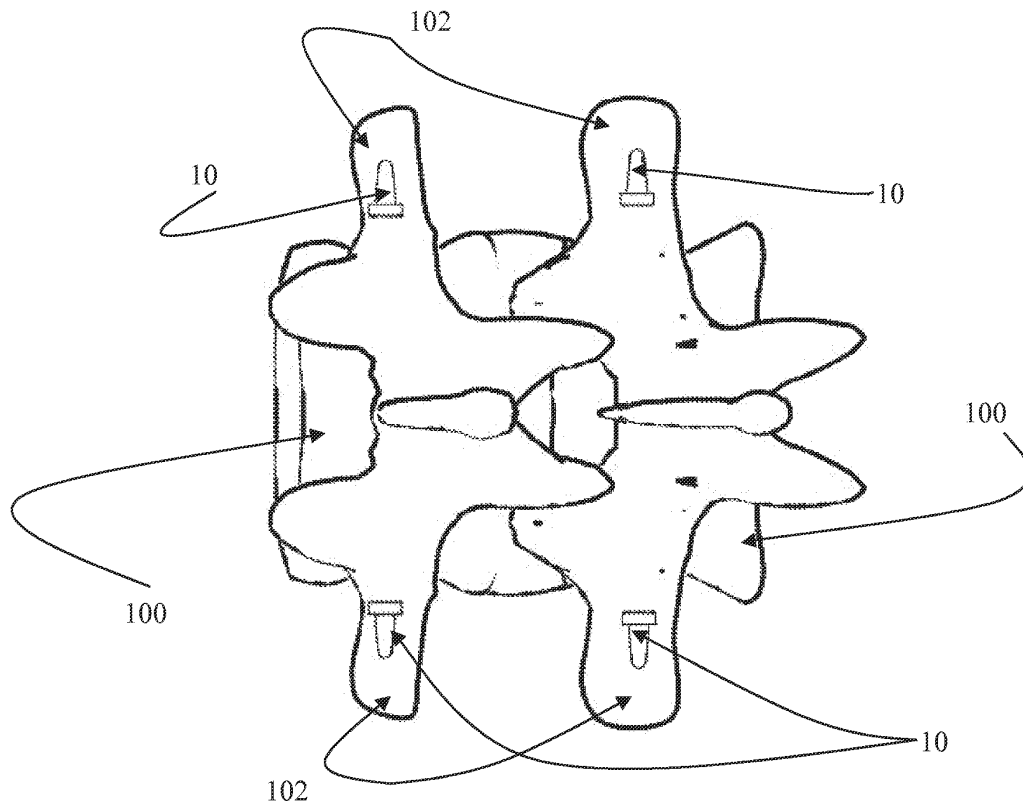


FIGURE 3D

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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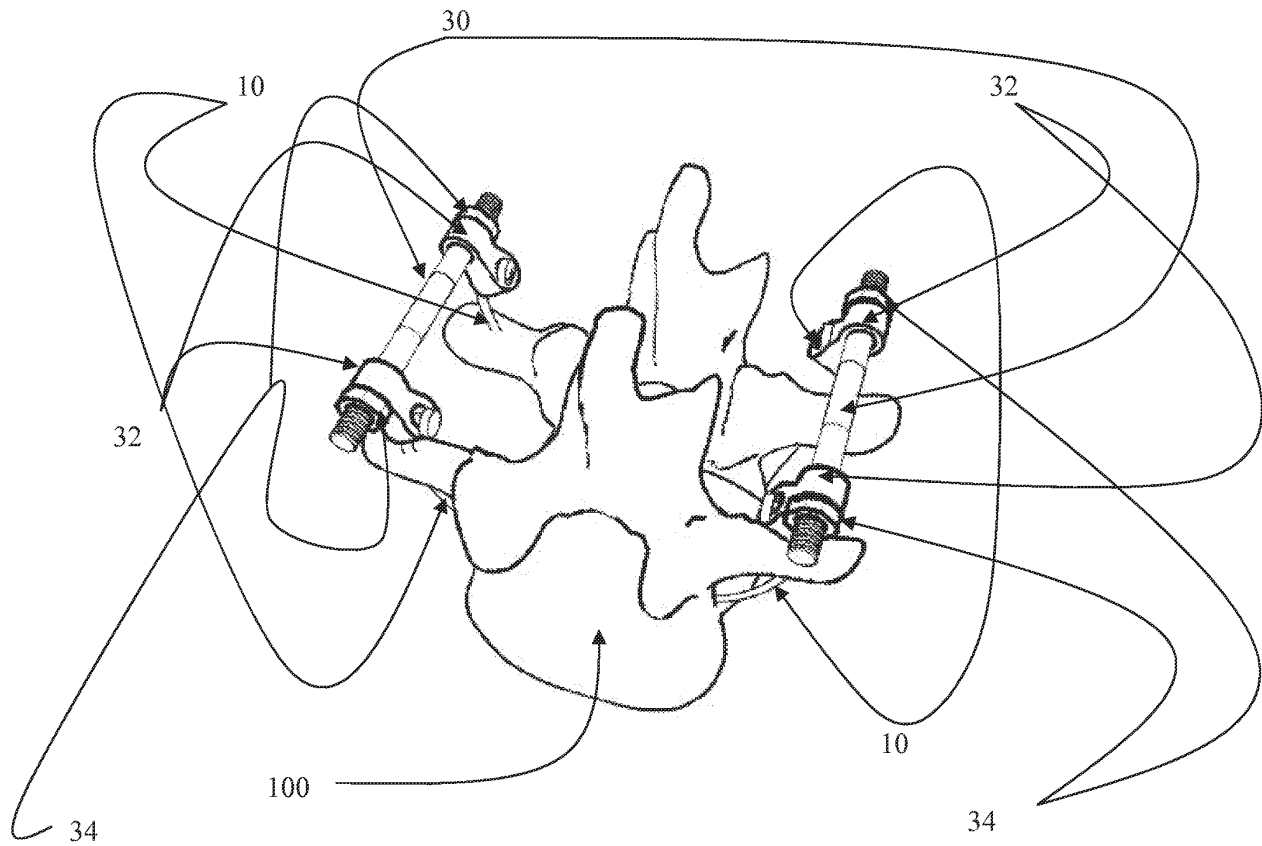


FIGURE 4A

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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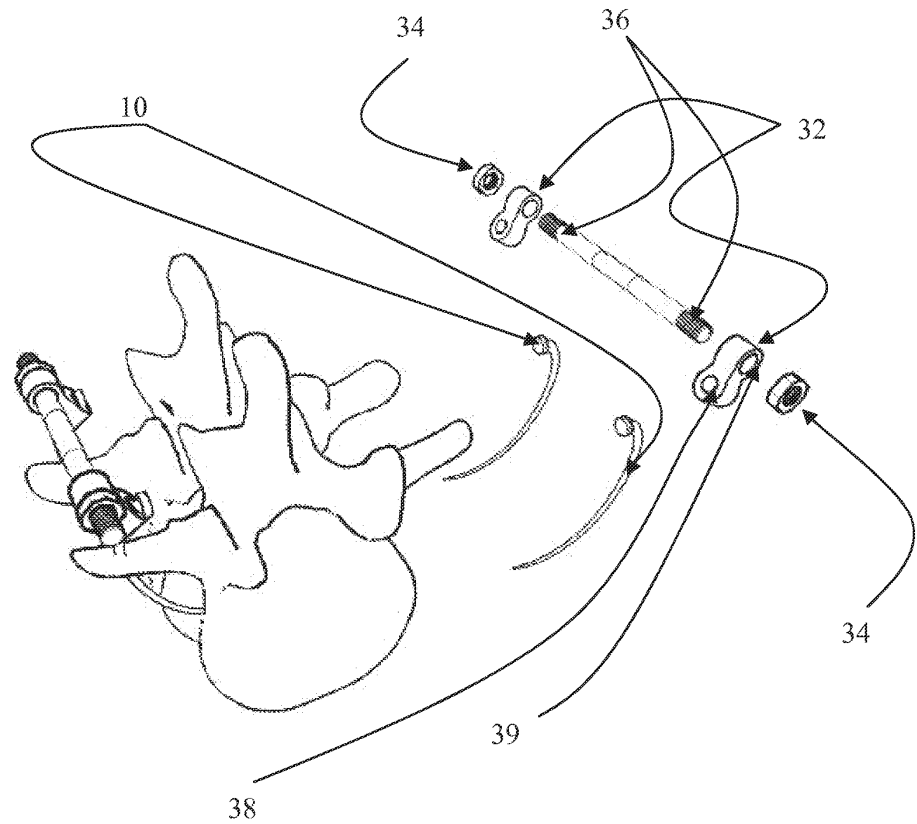


FIGURE 4B

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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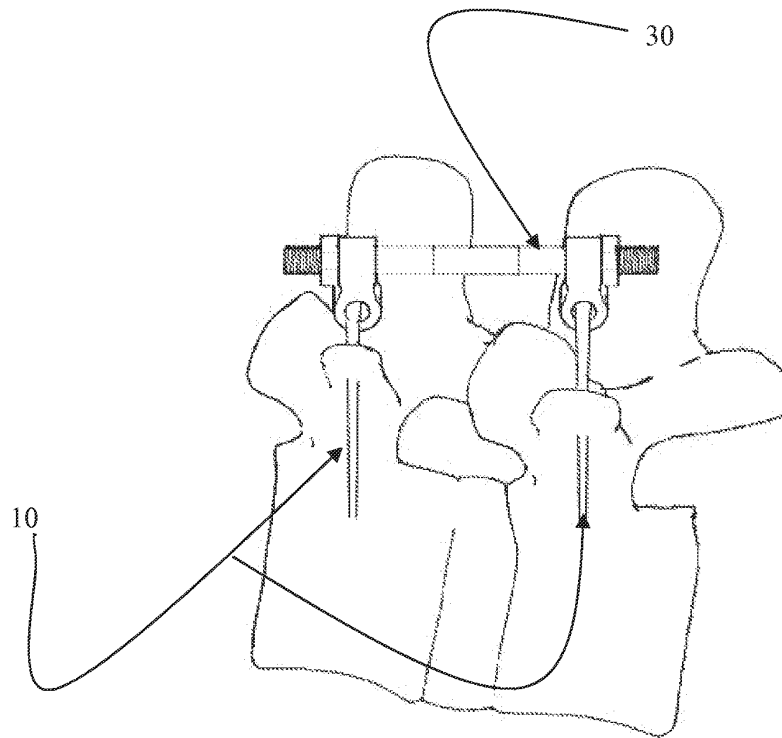


FIGURE 4C

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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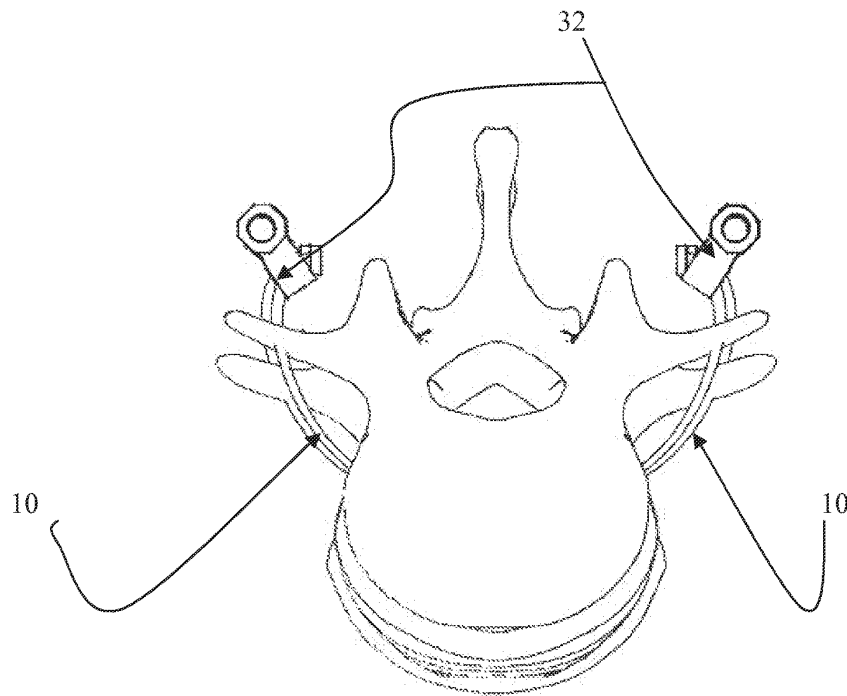


FIGURE 4D

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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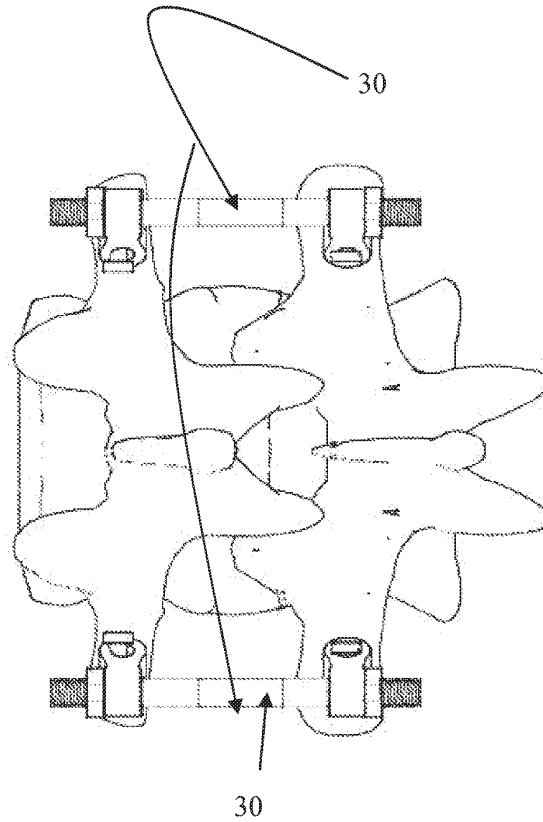


FIGURE 4E

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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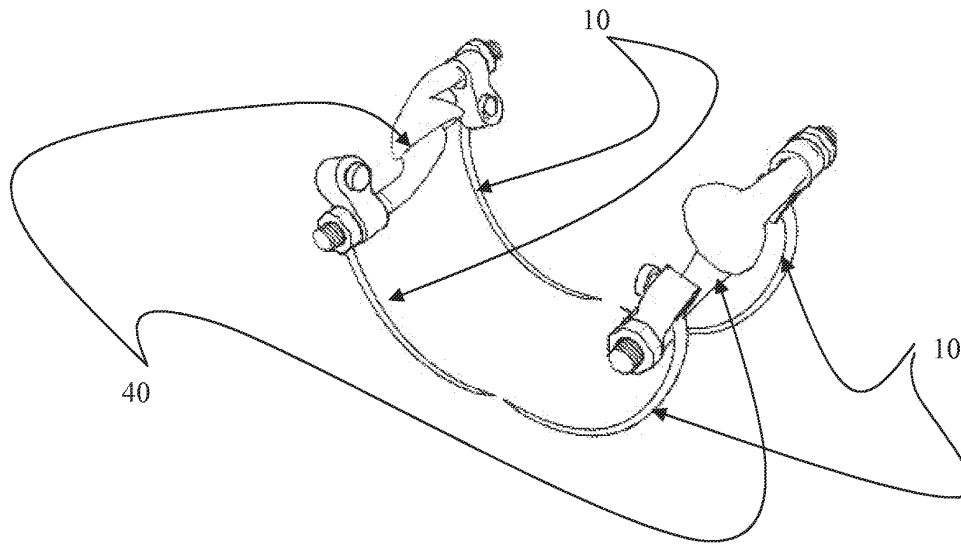


FIGURE 5A

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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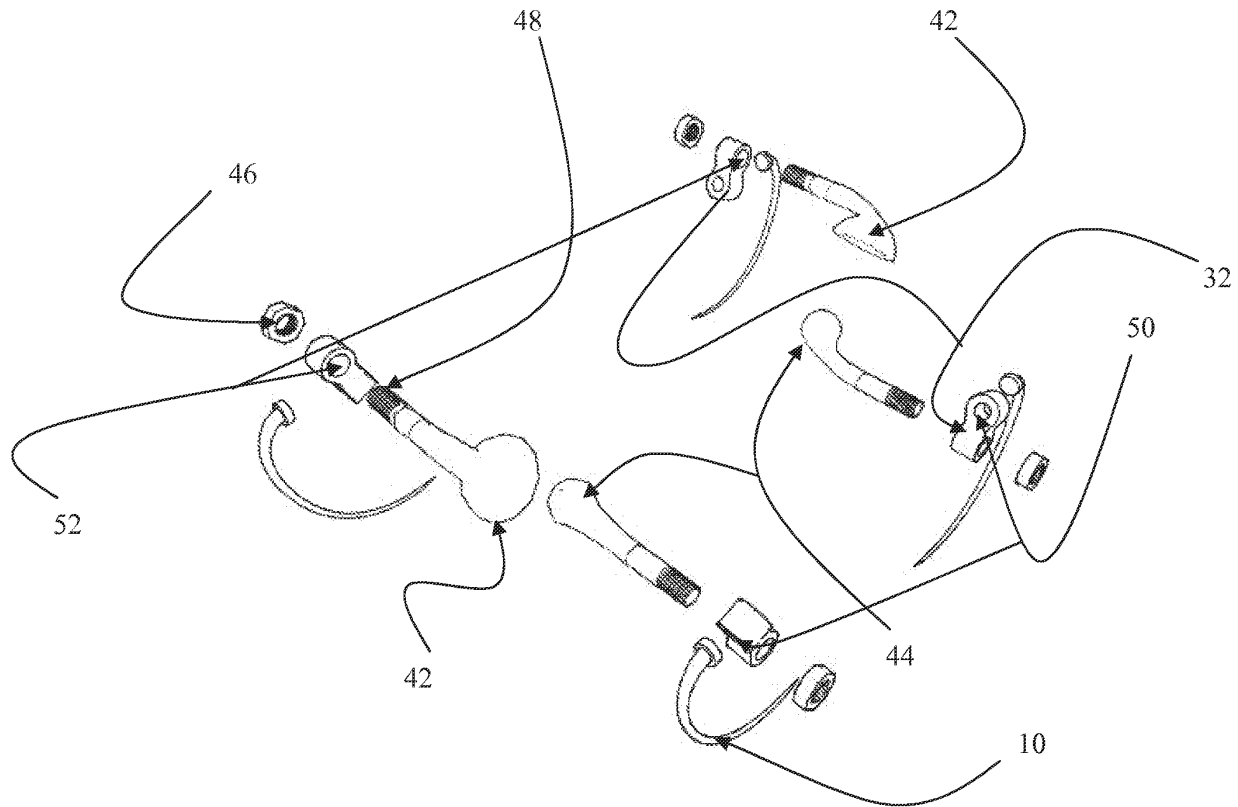


FIGURE 5B



Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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FIGURE 6A

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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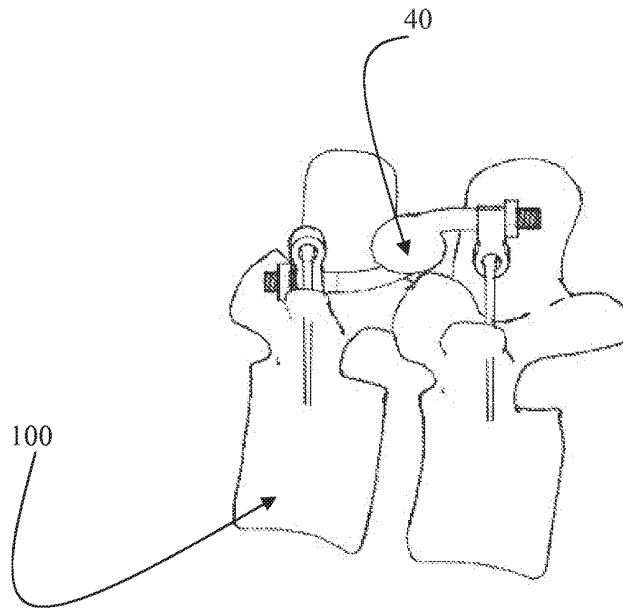


FIGURE 6B

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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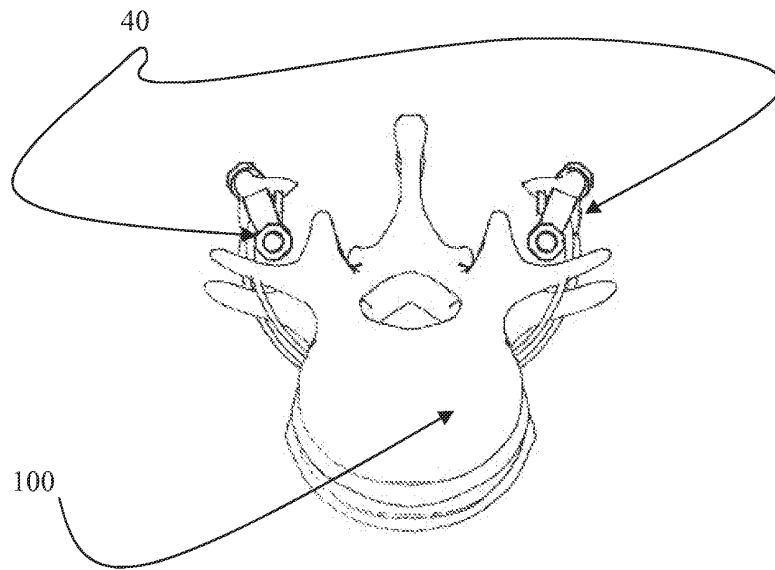


FIGURE 6C

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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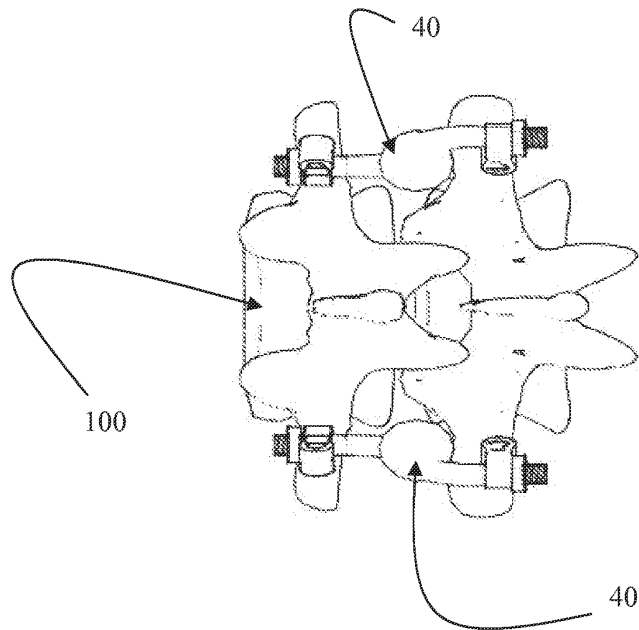


FIGURE 6D

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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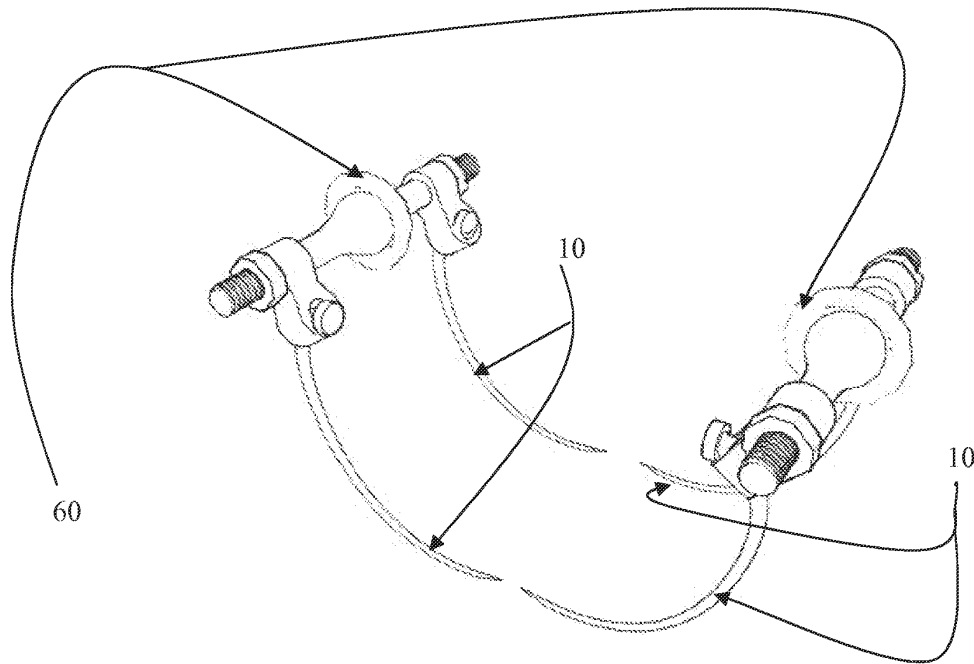


FIGURE 7A

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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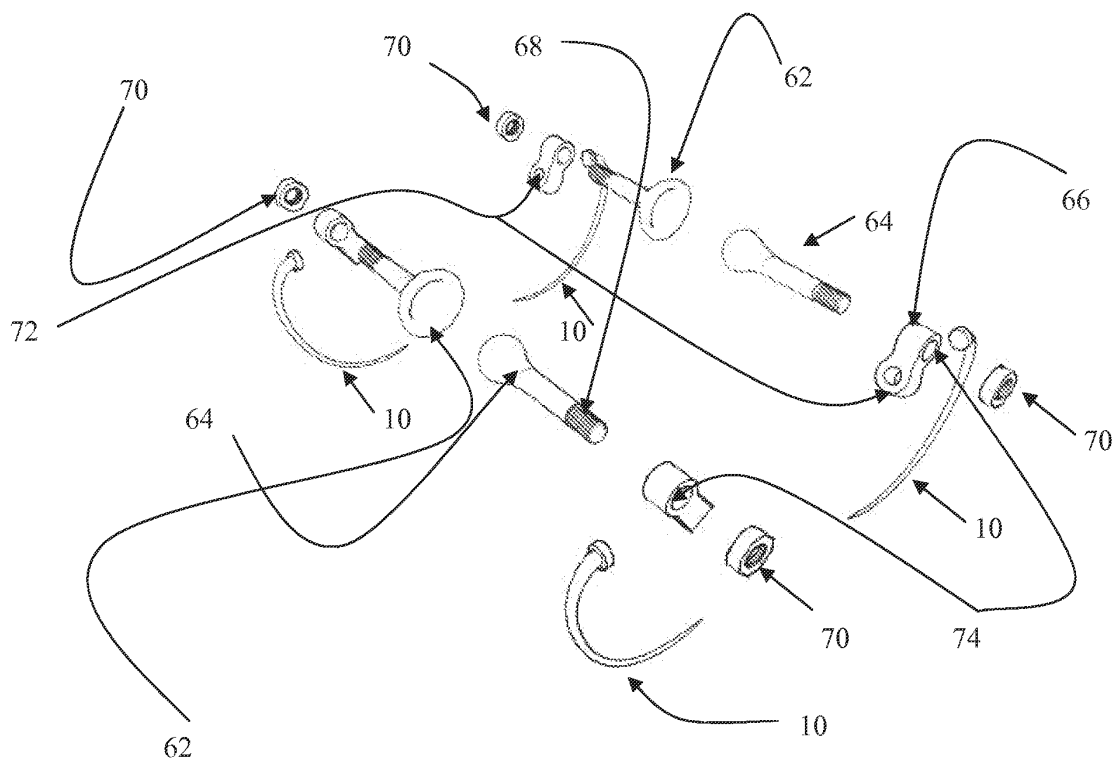


FIGURE 7B

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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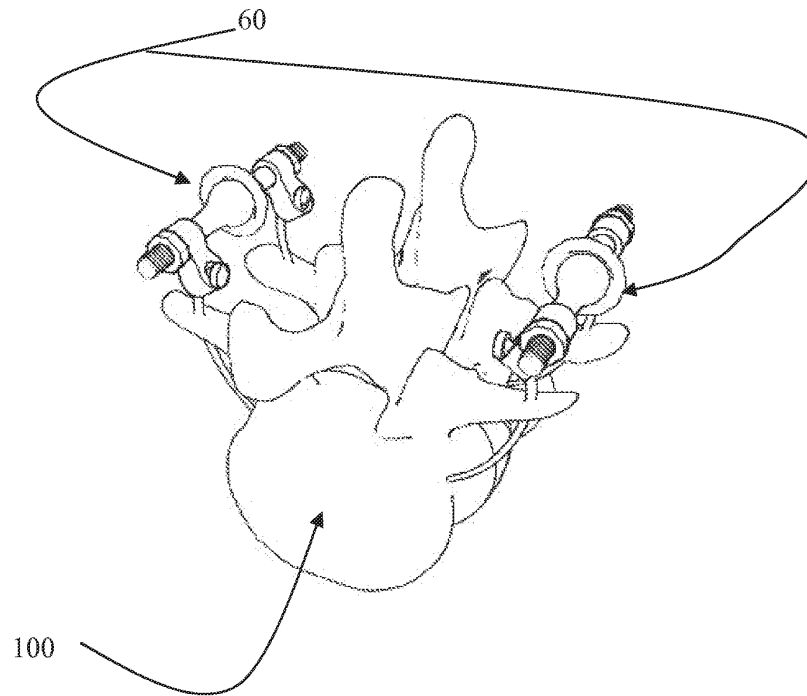


FIGURE 8A

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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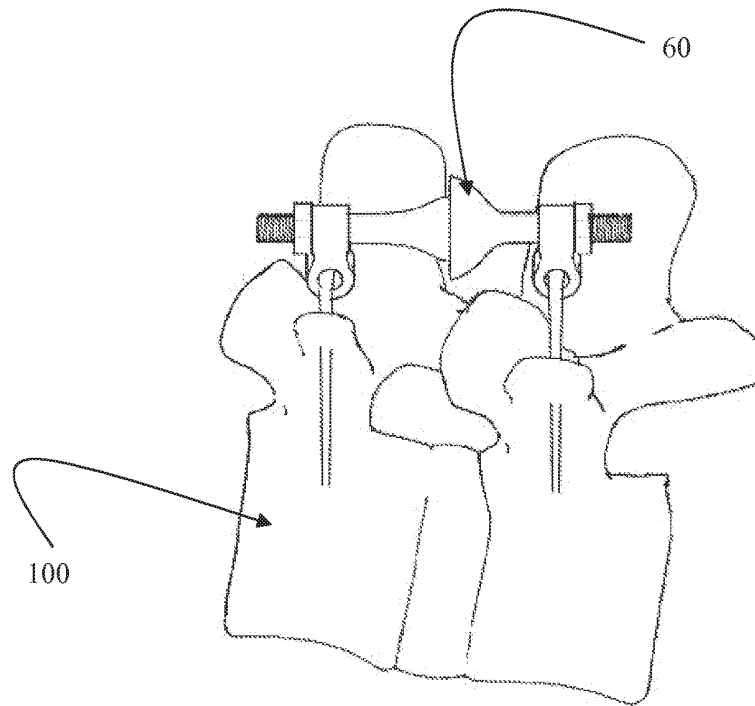


FIGURE 8B



Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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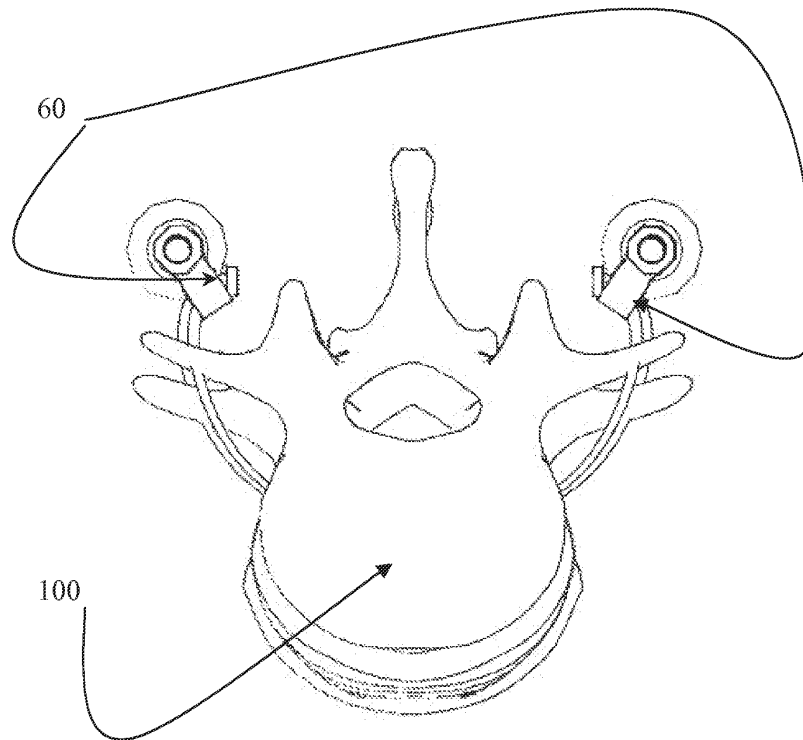


FIGURE 8C

Matter No.: 45335-0013002  
Applicant(s): Nathan C. Moskowitz  
HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH  
INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

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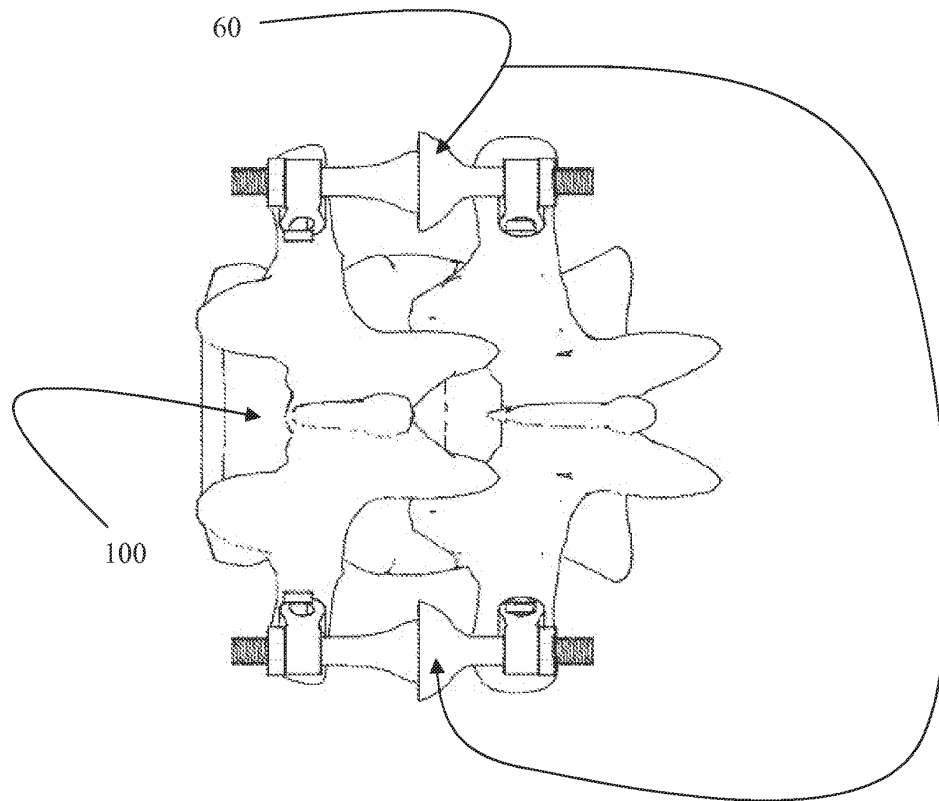


FIGURE 8D

## POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on the Transmittal.)

- ☒ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter, which may be an application filed after the date of this power of attorney, or identified above:

**26191**

OR

- ☐ I hereby appoint Practitioner(s) named in the attached list as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter, which may be an application filed after the date of this power of attorney, or identified above.

**Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:**

- ☐ The address associated with the above-mentioned Customer Number

OR

- ☒ The address associated with Customer Number: **26191**

OR

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Address			
City	State	Zip	
Country			
Telephone		Email	

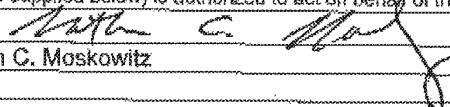
I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

--

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

### SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature			Date (Optional)	2/20/17
Name	Nathan C. Moskowitz			
Title				

**NOTE:** Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

- ☐ \*Total of \_\_\_\_\_ forms are submitted.

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MOSKOWITZ-00000070

**JTX-011.0070**

# TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

Application Number	To Be Assigned		
Filing Date	Herewith		
First Named Inventor	Nathan C. Moskowitz		
Title	HORIZONTAL-TRANSVERSEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		
Art Unit	Unknown		
Examiner Name	Unknown		
Attorney Docket Number	45335-0013002		
<b>SIGNATURE of Applicant or Patent Practitioner</b>			
Signature	/Stuart A. Nelson/	Date (Optional)	1/4/2018
Name	Stuart A. Nelson	Registration Number	63,947
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			
<b>NOTE:</b> This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.			
<input type="checkbox"/> *Total of _____ forms are submitted.			

61614393.doc

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		HORIZONTAL-TRANSVERSEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		
First Named Inventor/Applicant Name:		Nathan C. Moskowitz		
Filer:		Stuart A. Nelson/Abby Remer		
Attorney Docket Number:		45335-0013002		
Filed as Small Entity				
Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2000	2000
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>2800</b>

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	31405489
<b>Application Number:</b>	15862016
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	6203
<b>Title of Invention:</b>	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION
<b>First Named Inventor/Applicant Name:</b>	Nathan C. Moskowitz
<b>Customer Number:</b>	26191
<b>Filer:</b>	Stuart A. Nelson/Paul Stovenour
<b>Filer Authorized By:</b>	Stuart A. Nelson
<b>Attorney Docket Number:</b>	45335-0013002
<b>Receipt Date:</b>	04-JAN-2018
<b>Filing Date:</b>	
<b>Time Stamp:</b>	14:15:07
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$2800
RAM confirmation Number	010518INTEFSW00000449061050
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	TrackOne Request	Track1.pdf	150359	no	2
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Warnings:					
Information:					
2	Transmittal of New Application	PapTrans.pdf	115812	no	3
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Warnings:					
Information:					
3	Application Data Sheet	ADS.pdf	1823656	no	9
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4		Application.pdf	1110942	yes	23
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	Document Description		Start	End	
	Specification		1	21	
	Claims		22	22	
	Abstract		23	23	
Warnings:					
Information:					
5	Drawings-only black and white line drawings	Figures.pdf	1092684	no	33
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<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			4707094		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Doc Code: TRACK1.REQ  
 Document Description: TrackOne Request

PTO/AIA/424 (03-14)

**CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION  
 UNDER 37 CFR 1.102(e) (Page 1 of 1)**

First Named Inventor:	Nathan C. Moskowitz	Non provisional Application Number (if known):	
Title of Invention:	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

**APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.**

1. The processing fee set forth in 37 CFR 1.17(i)(1), the prioritized examination fee set forth in 37 CFR 1.17(c), and if not already paid, the publication fee set forth in 37 CFR 1.18(d) have been filed with the request. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.
2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims.
3. The applicable box is checked below:
  - I. ☒ **Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)**
    - i. (a) The application is an original non provisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.  
 ---OR---
      - (b) The application is an original non provisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.
    - ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, or the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.
  - II. ☐ **Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)**
    - i. A request for continued examination has been filed with, or prior to, this form.
    - ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
    - iii. The application is an original non provisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
    - iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
    - v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Stuart A. Nelson/	Date 1/4/2018
Name (Print/Typed) Stuart A. Nelson	Practitioner Registration Number 63,947
<p><b>Note:</b> This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.*</p> <p><input type="checkbox"/> *Total of _____ forms are submitted.</p>	

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MOSKOWITZ-00000077  
**JTX-011.0077**

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Prior to examination, please amend the application as indicated on the following pages.

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 2 of 8

Attorney Docket: 45335-0013002

Amendments to the Specification:

Please replace the paragraph beginning after the title with the following amended paragraph:

This application is a Continuation of Application Serial No. 12/957,776 filed December 1, 2010, which is a Continuation-In-Part of Application Serial No. 12/471,340 filed on May 22, 2009, now U.S. Patent No. 8,734,516 issued May 27, 2014, which is a Continuation-In-Part of Application Serial No. 12/054,335 filed on March 24, 2008, now U.S. Patent No. 7,972,363 issued July 5, 2011, which is a Continuation-In-Part of Application Serial No. 11/842,855 filed August 21, 2007, now U.S. Patent No. 7,942,903 issued May 17, 2011, which is a Continuation-In-Part of Application Serial No. 11/536,815 filed September 29, 2006, now U.S. Patent Application No. 7,846,188 issued December 7, 2010, and 12/957,776 filed December 1, 2010, claims priority under 35 U.S.C. § 119(e) of U.S. Provisional Application No. 60/670,231, filed on April 12, 2005, and U.S. Provisional Application No. 61/265,752, filed on December 1, 2009; the entire contents of all the above identified patent applications are hereby incorporated by reference in their entirety.

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 3 of 8

Attorney Docket: 45335-0013002

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Cancelled)

2. (New) A spinal fusion implant comprising:

- a first curvilinear nail-screw for penetration and implantation into a first vertebral body along a first curved trajectory that avoids penetrating pedicles, wherein the first curvilinear nail screw extends from a first proximal end to a first distal end along the first curved trajectory with a first head at the first proximal end and a first bone penetrating pointed tip at the first distal end, wherein the first curvilinear nail-screw comprises first means for engaging a first cancellous core of the first vertebral body positioned along a first distal portion of the first curvilinear nail-screw proximate the first distal end;
- a second curvilinear nail-screw for penetration and implantation into a second vertebral body along a second curved trajectory that avoids penetrating pedicles, wherein the second curvilinear nail screw extends from a second proximal end to a second distal end along the second curved trajectory with a second head at the second proximal end and a second bone penetrating pointed tip at the second distal end, wherein the second curvilinear nail-screw comprises second means for engaging a second cancellous core of the second vertebral body positioned along a second distal portion of the second curvilinear nail-screw proximate the second distal end; and
- a connecting support structure defining a first hole sized and configured for receiving the first curvilinear nail screw and a second hole sized and configured for receiving the second curvilinear nail screw such that the first curvilinear nail-

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 4 of 8

Attorney Docket: 45335-0013002

screw is held with respect to the second curvilinear nail-screw with the first curvilinear nail-screw extending into the first vertebral body without penetrating pedicles and the second curvilinear nail-screw extending into the second vertebral body without penetrating pedicles.

3. (New) The spinal fusion implant of claim 2, and further comprising first and second rotatable connectors configured for retaining the first and second curvilinear nail-screws to the connecting support structure.

4. (New) The spinal fusion implant of claim 2, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise radially arranged fish-hooks.

5. (New) The spinal fusion implant of claim 2, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise threads.

6. (New) The spinal fusion implant of claim 2, wherein the first curvilinear nail-screw comprises a first smooth portion between the first head and the first distal portion and wherein the second curvilinear nail-screw comprises a second smooth portion between the second head and the second distal portion, and wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body each comprise one or more ridges.

7. (New) The spinal fusion implant of claim 2, wherein the connecting support comprises at least first and second components, wherein the first component defines the first hole for the first curvilinear nail screw, and wherein the first component is connected directly to the second component.



First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 5 of 8

Attorney Docket: 45335-0013002

8. (New) The spinal fusion implant of claim 7, wherein the connecting support comprise a third component that defines the second hole for the second curvilinear nail screw and wherein the third component is connected directly to the second component.
9. (New) The spinal fusion implant of claim 2, wherein the connecting support structure is a bar.
10. (New) The spinal fusion implant of claim 2, wherein the first and second curvilinear nail-screws are oriented by the connecting support structure to be introduced laterally into the first and second vertebral bodies.
11. (New) The spinal fusion implant of claim 2, wherein the first and second curvilinear nail-screws are oriented by the connecting support structure to be introduced posteriorly into the first and second vertebral bodies.
12. (New) The spinal fusion implant of claim 2, wherein the first and second curvilinear nail-screws are oriented by the connecting support structure to be introduced anteriorly into the first and second vertebral bodies.
13. (New) The spinal fusion implant of claim 2, wherein the first and second heads comprise first and second caps.
14. (New) The spinal fusion implant of claim 2, wherein the connecting support structure is sized and configured to be positioned exterior to the first and second vertebral bodies when connecting the first and second curvilinear nail-screws while the first and second curvilinear nail-screws penetrate into the first and second vertebral bodies.
15. (New) A method of implanting a spinal fusion implant, the method comprising:  
    implanting a first curvilinear nail-screw to penetrate into a first vertebral body along a first curved trajectory that avoids pedicles, wherein the first curvilinear nail screw extends from a first proximal end to a first distal end along the first curved



First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 6 of 8

Attorney Docket: 45335-0013002

trajectory with a first head at the first proximal end and a first bone penetrating pointed tip at the first distal end, wherein the first curvilinear nail-screw comprises first means for engaging a first cancellous core of the first vertebral body positioned along a first distal portion of the first curvilinear nail-screw proximate the first distal end, wherein the first head is positioned exterior to the first vertebral body and the first distal portion is positioned in the first cancellous core when implanted;

implanting a second curvilinear nail-screw to penetrate into a second vertebral body along a second curved trajectory that avoids pedicles, wherein the second curvilinear nail screw extends from a second proximal end to a second distal end along the second curved trajectory with a second head at the second proximal end and a second bone penetrating pointed tip at the second distal end, wherein the second curvilinear nail-screw comprises second means for engaging a second cancellous core of the second vertebral body positioned along a second distal portion of the second curvilinear nail-screw proximate the second distal end, wherein the second head is positioned exterior to the second vertebral body and the second distal portion is positioned in the second cancellous core when implanted;

connecting the first curvilinear nail-screw to the second curvilinear nail-screw via a connecting support structure such that the first curvilinear nail-screw is held with respect to the second curvilinear nail-screw with the first curvilinear nail-screw extending into the first vertebral body without penetrating pedicles and the second curvilinear nail-screw extending into the second vertebral body without penetrating pedicles.

16. (New) The method of claim 15, wherein the first curvilinear nail-screw penetrates into the first vertebral body so as to traverse no more than 50% of the first vertebral body and the second curvilinear nail-screw penetrates into the second vertebral body so as to traverse no more than 50% of the second vertebral body.

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 7 of 8

Attorney Docket: 45335-0013002

17. (New) The method of claim 15, wherein the first and second curvilinear nail-screws penetrate into the first and second vertebral bodies without traversing an intervertebral disk.

18. (New) The method of claim 15, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise radially arranged fish-hooks.

19. (New) The method of claim 15, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise threads.

20. (New) The method of claim 15, wherein the first and second curvilinear nail-screws are introduced laterally into the first and second vertebral bodies.

21. (New) The method of claim 15, wherein the first and second curvilinear nail-screws are introduced anteriorly into the first and second vertebral bodies.

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 8 of 8

Attorney Docket: 45335-0013002

REMARKS

With this amendment, claim 1 is cancelled without prejudice and claims 2-21 are added. Support for this amendment can be found throughout the specification and claims. Applicant asks that all claims be examined in view of the amendment to the claims.

No fees are believed to be due. Please apply any necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: 1/8/2018

/Stuart A. Nelson/  
Stuart A. Nelson  
Reg. No. 63,947

Customer Number 26191  
Fish & Richardson P.C.  
Telephone: (612) 337-2538  
Facsimile: (877) 769-7945

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Electronic Acknowledgement Receipt	
EFS ID:	31433116
Application Number:	15862016
International Application Number:	
Confirmation Number:	6203
Title of Invention:	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION
First Named Inventor/Applicant Name:	Nathan C. Moskowitz
Customer Number:	26191
Filer:	Stuart A. Nelson/Abby Remer
Filer Authorized By:	Stuart A. Nelson
Attorney Docket Number:	45335-0013002
Receipt Date:	08-JAN-2018
Filing Date:	
Time Stamp:	13:58:09
Application Type:	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	no				
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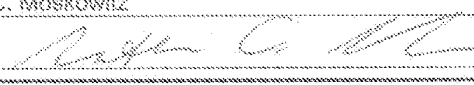
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	<b>Document Description</b>	<b>Start</b>	<b>End</b>	
	Preliminary Amendment	1	1	
	Specification	2	2	
	Claims	3	7	
	Applicant Arguments/Remarks Made in an Amendment	8	8	
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<b>Information:</b>				
<b>Total Files Size (in bytes):</b>			2956795	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>          If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>          If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>          If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>				

Attorney Docket No.: 45335-0013002

PTO/AIA/01 (28-12)  
 Approved for use through 01/01/2014, OMB 0551-0002  
 U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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# DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		
As the below named inventor, I hereby declare that:			
This declaration is directed to:	<input type="checkbox"/>	The attached application, or	
	<input checked="" type="checkbox"/>	United States application or PCT international application number	15/862,016
		filed on	January 4, 2018.
The above-identified application was made or authorized to be made by me.			
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.			
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.			
<b>WARNING:</b>			
<p>Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is reentered in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.</p>			
LEGAL NAME OF INVENTOR			
Inventor:	Nathan C. Moskowitz		Date (Optional): 4/5/18
Signature:			
<p>Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.</p>			

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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61815373.doc

Attorney Docket No.: 45335-6013602

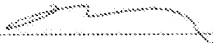
PTO/AIA/01 (06-12)

Approved for use through 01/31/2014, OMB 0651-0032

U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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# DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		
As the below named inventor, I hereby declare that:			
This declaration is directed to:		<input type="checkbox"/> The attached application, or <input checked="" type="checkbox"/> United States application or PCT International application number <u>15/862,016</u> filed on <u>January 4, 2018</u> .	
The above-identified application was made or authorized to be made by me.			
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.			
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.			
<b>WARNING:</b>			
Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.			
LEGAL NAME OF INVENTOR			
Inventor:		Mosheh T. Moskowitz	
Date (Optional):		<u>11/5/18</u>	
Signature:			
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.			

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Attorney Docket No.: 46335-0013092

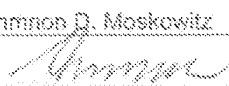
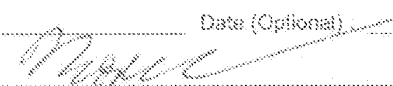
PTO/AIA/01 (08-12)

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U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)**

<b>Title of Invention</b>	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		
As the below named inventor, I hereby declare that:			
This declaration is directed to:		<input type="checkbox"/> The attached application, or <input checked="" type="checkbox"/> United States application or PCT international application number <u>15/862,016</u> filed on <u>January 4, 2018</u> .	
The above-identified application was made or authorized to be made by me.			
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.			
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.			
<b>WARNING:</b>			
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<b>LEGAL NAME OF INVENTOR</b>			
Inventor:	<u>Ahmnnon D. Moskowitz</u>		Date (Optional): _____
Signature:	 		
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.			

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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MOSKOWITZ-00000091

**JTX-011.0091**



Attorney Docket No.: 45335-0013002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor : Nathan C. Moskowitz                      Art Unit : Unknown  
Serial No. : 15/862,016    Examiner : Unknown  
Filed : January 4, 2018    Conf. No. : 6203  
Title : HORIZONTAL-TRANSVERSEBRAL CURVILINEAR NAIL-  
SCREWS WITH INTER-LOCKING RIGID OR JOINTED  
FLEXIBLE RODS FOR SPINAL FUSION

**MAIL STOP AMENDMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 Form.

Under 35 USC §120, this application relies on the earlier filing date of application serial number 12/957,776, filed on December 1, 2010. All references listed on the PTO-1449 Form were submitted to and/or cited by the Office in the prior application, and so copies of those references are not provided in this application.

This statement is being filed within three months of the filing date of the application or before the receipt of a first action on the merits.

Apply any necessary charges or credits to deposit account 06-1050, referencing the above attorney docket number.

Please contact the undersigned if there are any questions regarding this statement.

Respectfully submitted,

Date: 1/10/2018

/Stuart A. Nelson/

Stuart A. Nelson  
Reg. No. 63,947

Customer Number 26191  
Fish & Richardson P.C.  
Telephone: (612) 337-2538  
Facsimile: (877) 769-7945

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First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 2 of 2

Attorney Docket: 45335-0013002

Sheet 1 of 4

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)		Applicant Nathan C. Moskowitz	
		Filing Date January 4, 2018	Group Art Unit
(37 CFR §1.98(b))			

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1.	8,105,362	01-2012	Duarte			
	2.	2008/0045951	02-2008	Fanger et al.			
	3.	5,609,593	03-1997	Errico et al.			
	4.	7,713,289	05-2010	Matthys			
	5.	7,879,036	02-2011	Biedermann et al.			
	6.	6,652,527	11-2003	Zucherman et al.			
	7.	4,274,401	06-1981	Miskew			
	8.	2010/0094346	04-2010	Matityahu			
	9.	4,790,303	12-1988	Steffee			
	10.	2,430,293	11-1947	Howells			
	11.	8,357,198	01-2013	McGraw et al.			
	12.	6,689,125	02-2004	Keith et al.			
	13.	5123926	1992-06-23	Pisharodi			
	14.	5514180	1996-05-07	Heggeness et al.			
	15.	6368350	2002-04-09	Erickson et al.			
	16.	6419704	2002-07-16	Ferree			
	17.	6458159	2002-10-01	Thalgott			
	18.	6527804	2003-03-04	Gauchet et al.			
	19.	6533818	2003-03-18	Weber et al.			
	20.	6579318	2003-06-17	Varga et al.			
	21.	6582468	2003-06-24	Gauchet			
	22.	6719794	2004-04-13	Gerber			
	23.	6733532	2004-05-11C	Gauchet et al.			
	24.	6764491	2004-07-20	Frey et al.			
	25.	6770094	2004-08-03	Fehling et al.			
	26.	6572653	2003-06-03	Simonson			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

Sheet 2 of 4

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)		Applicant Nathan C. Moskowitz	
		Filing Date January 4, 2018	Group Art Unit
(37 CFR §1.98(b))			

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	27.	5782832	1998-07-21	Larsen et al.			
	28.	6641614	2003-11-04	Wagner et al.			
	29.	6126689	2000-10-03	Brett			
	30.	6375682	2002-04-23	Fleischmann et al.			
	31.	6723126	2004-04-20	Berry			
	32.	5667472	1997-09-07	Finn et al.			
	33.	6955671	2005-10-18	Uchikubo			
	34.	7037258	2006-05-02	Chatenever et al.			
	35.	6904308	2005-06-07	Frisch et al.			
	36.	7097615	2006-08-29	Banik et al.			
	37.	7030904	2006-04-18	Adair et al.			
	38.	4997432	1991-03-05	Keller			
	39.	5960522	1999-10-05	Boe			
	40.	5660188	1997-08-26	Groiso			
	41.	4960420	1990-10-02	Goble et al.			
	42.	4636217	1987-01-13	Ogilvie et al.			
	43.	4554914	1985-11-26	Kapp et al.			
	44.	6953477	2005-10-11	BERRY			
	45.	4599086	1986-07-08	DOTY			
	46.	5062850	1991-11-05	MACMILLAN et al.			
	47.	5290312	1994-03-01	KOJIMOTO et al.			
	48.	5865848	1999-02-02	Baker			
	49.	7211112	2007-05-01	Baynham et al.			
	50.	5405391	1995-04-11	Henderson et al.			
	51.	7862616	2011-01-04	Lechmann et al.			
	52.	6972019	2005-12-06	Michelson			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

MOSKOWITZ-00000095  
**JTX-011.0095**

Sheet 3 of 4

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)		Applicant Nathan C. Moskowitz	
		Filing Date January 4, 2018	Group Art Unit
(37 CFR §1.98(b))			

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	53.	6629998	2003-10-07	Lin			
	54.	6824564	2004-11-30	Crozet			
	55.	7442209	2008-10-28	Michelson			
	56.	6342074	2002-01-29	Simpson			
	57.	6558423	2003-05-06	Michelson			
	58.	6432106	2002-08-13	Fraser			
	59.	7326248	2008-02-05	Michelson			
	60.	7033394	2006-04-25	Michelson			
	61.	5888223	1999-03-30	Bray, Jr.			
	62.	8403986	2013-03-26	Michelson			
	63.	8328872	2012-12-11	Duffield et al.			
	64.	20040088054	2004-05-06	Berry			
	65.	20050273170	2005-12-08	Navarro et al.			
	66.	20040177531	2004-09-16	DiBenedetto et al.			
	67.	20050278026	2005-12-15	Gordon, et al.			
	68.	20050216084	2005-09-29	Fleischmann			
	69.	20050027362	2005-02-03	Williams et al.			
	70.	20050049590	2005-03-03	Alleyne et al.			
	71.	20040254644	2004-12-16	Taylor			
	72.	20020143338	2002-10-03	ORBAY et al.			
	73.	20050177235	2005-08-11	BAYNHAM et al.			
	74.	20020068977	2002-06-06	JACKSON			
	75.	20070213820	2007-09-13	MAGERL et al.			
	76.	20100145460	2010-06-10	McDonough et al.			
	77.	20090105831	2009-04-23	Jones et al.			
	78.	8951295	2/2015	Matityahu et al.			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

Sheet 4 of 4

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)		Applicant Nathan C. Moskowitz	
		Filing Date January 4, 2018	Group Art Unit
(37 CFR §1.98(b))			

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	79.	20010021852	9/2001	Chappius			
	80.	20080188896	8/2008	Sevrain			
	81.	6471707	10/2002	Miller et al.			
	82.	6558386	5/2003	Cragg			
	83.	20100211108	8/2010	Lemole			
	84.	4013207	3/1977	ErkenBrack			
	85.	4165597	8/1979	Scanland et al			

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	86.	2004093749	2004-11-04	WO				
	87.	2006091503	2006-08-31	WO				

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	88.	Vincent C. TRAYNELIS, "Prosthetics and Biologics: The Wave of the Future," CLINICAL NEUROSURGERY, Volume 50, Proceedings of the Congress of Neurological Surgeons, Philadelphia, PA 2002, Chapter 9, pages 207-219
	89.	E.K. WAI et al., "Disk Replacement Arthroplasties: Can The Success of Hip and Knee Replacements be Repeated in the Spine?," Seminars in Spine Surgery, Vol. 15, No. 4 (December) 2003, pp 473-482
	90.	Richard D. GUYER et al., "Intervertebral Disc Prostheses," SPINE JOURNAL, Volume 28, Number 15S, Supp. To 8/1/03, pages S15-S23
	91.	DIETER GROB et al., "Clinical Experience With the Dynesys Semirigid Fixation System for the Lumbar Spine," SPINE, Vol. 30, No. 3, 2005, pp. 324-331
	92.	International Search Report (ISR) and Written Opinion of the International Searching Authority, 03 December 2007, International Application No. PCT/US 07/05005
	93.	International Search Report (ISR) and Written Opinion of the International Searching Authority, 21 May 2008, International Application No. PCT/US2007/021015
	94.	International Search Report (ISR) and Written Opinion of the International Searching Authority, 09 July 2008, International Application No. PCT/US2007021013

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	31457632
<b>Application Number:</b>	15862016
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	6203
<b>Title of Invention:</b>	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION
<b>First Named Inventor/Applicant Name:</b>	Nathan C. Moskowitz
<b>Customer Number:</b>	26191
<b>Filer:</b>	Stuart A. Nelson/Melissa Andersen
<b>Filer Authorized By:</b>	Stuart A. Nelson
<b>Attorney Docket Number:</b>	45335-0013002
<b>Receipt Date:</b>	10-JAN-2018
<b>Filing Date:</b>	
<b>Time Stamp:</b>	12:11:44
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment		no			
<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	Transmittal.pdf	72238 b56fec2a123e65962b28cd561ca8c84662e dcf3	no	2
<b>Warnings:</b>					

<b>Information:</b>					
This is not an USPTO supplied IDS fillable form					
2	Information Disclosure Statement (IDS) Form (SB08)	PTO_1449.pdf	144402	no	4
			75b7532558626424c74c8869d2490a7effe9ed03		
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied IDS fillable form					
<b>Total Files Size (in bytes):</b>			216640		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>          If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>          If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>          If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					





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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
15/862,016	01/04/2018	3733	730	45335-0013002	20	2

CONFIRMATION NO. 6203

## FILING RECEIPT



0000000098974845

26191

FISH & RICHARDSON P.C. (TC)  
 PO BOX 1022  
 MINNEAPOLIS, MN 55440-1022

Date Mailed: 01/30/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

## Inventor(s)

Nathan C. Moskowitz, Rockville, MD;  
 Mosheh T. Moskowitz, Rockville, MD;  
 Ahmnon D. Moskowitz, Rockville, MD;

## Applicant(s)

Nathan C. Moskowitz, Rockville, MD;

**Power of Attorney:** The patent practitioners associated with Customer Number 26191

## Domestic Priority data as claimed by applicant

This application is a CON of 12/957,776 12/01/2010 PAT 9888918  
 which is a CIP of 12/471,340 05/22/2009 PAT 8734516  
 which is a CIP of 12/054,335 03/24/2008 PAT 7972363  
 which is a CIP of 11/842,855 08/21/2007 PAT 7942903  
 which is a CIP of 11/536,815 09/29/2006 PAT 7846188  
 which is a CIP of 11/208,644 08/23/2005 PAT 7704279  
 and said 12/957,776 12/01/2010  
 claims benefit of 60/670,231 04/12/2005  
 and claims benefit of 61/265,752 12/01/2009

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 01/26/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/862,016**

**Projected Publication Date:** 05/10/2018

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

HORIZONTAL-TRANSVERSE BRACED CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

**Preliminary Class**

606

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## **LICENSE FOR FOREIGN FILING UNDER**

### **Title 35, United States Code, Section 184**

### **Title 37, Code of Federal Regulations, 5.11 & 5.15**

#### **GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

#### **NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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### ***SelectUSA***

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

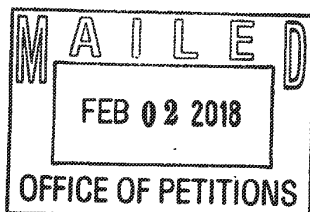
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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875						Application or Docket Number 15/862,016	
<b>APPLICATION AS FILED - PART I</b>							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)	RATE(\$)	FEE(\$)	
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75	N/A		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330	N/A		
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380	N/A		
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *	x 230 =	0.00	OR		
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00	OR		
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00	OR		
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	785	OR	TOTAL	
<b>APPLICATION AS AMENDED - PART II</b>							
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(j))	*	Minus **	=	x	=	OR
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x	=	OR
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(j))	*	Minus **	=	x	=	OR
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x	=	OR
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.</p>							



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Doc Code: TRACK1.GRANT

<b>Decision Granting Request for Prioritized Examination (Track I or After RCE)</b>	Application No.: 15/862,016
<p>1. THE REQUEST FILED <u>January 4, 2018</u> IS <u>GRANTED</u>.</p> <p>The above-identified application has met the requirements for prioritized examination</p> <p>A. <input checked="" type="checkbox"/> for an original nonprovisional application (Track I).</p> <p>B. <input type="checkbox"/> for an application undergoing continued examination (RCE).</p> <p>2. <b>The above-identified application will undergo prioritized examination.</b> The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:</p> <p>A. filing a <u>petition for extension of time</u> to extend the time period for filing a reply;</p> <p>B. filing an <u>amendment to amend the application to contain more than four independent claims, more than thirty total claims</u>, or a multiple dependent claim;</p> <p>C. filing a <u>request for continued examination</u>;</p> <p>D. filing a notice of appeal;</p> <p>E. filing a request for suspension of action;</p> <p>F. mailing of a notice of allowance;</p> <p>G. mailing of a final Office action;</p> <p>H. completion of examination as defined in 37 CFR 41.102; or</p> <p>I. abandonment of the application.</p> <p>Telephone inquiries with regard to this decision should be directed to Brian W. Brown at 571-272-5338.</p> <p>/Brian W. Brown/ [Signature]</p> <p>Petitions Examiner, Office of Petitions (Title)</p>	

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MOSKOWITZ-00000105  
**JTX-011.0105**





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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/862,016	01/04/2018	Nathan C. Moskowitz	45335-0013002	6203

26191	7590	02/21/2018
FISH & RICHARDSON P.C. (TC)		
PO BOX 1022		
MINNEAPOLIS, MN 55440-1022		

EXAMINER	
JOHANAS, JACQUELINE T	

ART UNIT	PAPER NUMBER
3733	

NOTIFICATION DATE	DELIVERY MODE
02/21/2018	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

<b>Examiner-Initiated Interview Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	15/862,016		MOSKOWITZ ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Jacqueline Johanas		3733	

All participants (applicant, applicant's representative, PTO personnel):

(1) Jacqueline Johanas (3) \_\_\_\_\_

(2) Stuart Nelson (Reg. 63947) (4) \_\_\_\_\_

Date of Interview: 12 February 2018.

Type: ☒ Telephonic ☐ Video Conference  
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.  
If Yes, brief description: \_\_\_\_\_

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 2-21.

Identification of prior art discussed: n/a.

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Examiner called to request oral election between apparatus claims (2-14) and method claims (15-21). Applicant elected apparatus claims without traverse.

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Jacqueline Johanas/ Primary Examiner, Art Unit 3733	
---	--



<b>Office Action Summary</b>	<b>Application No.</b> 15/862,016		<b>Applicant(s)</b> MOSKOWITZ ET AL.	
	<b>Examiner</b> Jacqueline Johanas		<b>Art Unit</b> 3733	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on 01/08/2018.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.

2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.

3) ☒ An election was made by the applicant in response to a restriction requirement set forth during the interview on 12 February 2018; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

5) ☒ Claim(s) 2-21 is/are pending in the application.  
5a) Of the above claim(s) 15-21 is/are withdrawn from consideration.

6) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

7) ☒ Claim(s) 2-14 is/are rejected.

8) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

9) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

10) ☒ The specification is objected to by the Examiner.

11) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a) ☐ All    b) ☐ Some\*\*    c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date 01/10/2018

3) ☒ Interview Summary (PTO-413)  
Paper No(s)/Mail Date 20180213

4) ☐ Other: \_\_\_\_\_

Application/Control Number: 15/862,016  
Art Unit: 3733

Page 2

The present application is being examined under the pre-AIA first to invent provisions.

#### **DETAILED ACTION**

##### ***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 2-14, drawn to a spinal fusion implant, classified in A61B17/7001.

II. Claims 15-21, drawn to a method of implanting a spinal fusion implant, classified in A61B17/88.

The inventions are distinct, each from the other because of the following reasons:

Inventions of Group I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product. See MPEP § 806.05(h). In the instant case the method can be practiced with another materially different product such as an implant comprising a connecting support structure having a solid rod (i.e. a structure absent any holes) which is seated within a head of the first and second curvilinear nail-screws.

Restriction for examination purposes as indicated is proper because all the inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and/or examination burden if restriction were not required because one or more of the following reasons apply:

Application/Control Number: 15/862,016  
Art Unit: 3733

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the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries); the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph

**Applicant is advised that the reply to this requirement to be complete must include (i) an election of an invention to be examined** even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected invention.**

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other invention.

Application/Control Number: 15/862,016  
Art Unit: 3733

Page 4

**During a telephone conversation with Stuart Nelson (reg. 63947) on 02/12/2018 a provisional election was made without traverse to prosecute the invention of Group I, claims 2-14.** Affirmation of this election must be made by applicant in replying to this Office action. Claims 15-21 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be corrected in compliance with 37 CFR 1.48(a) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. A request to correct inventorship under 37 CFR 1.48(a) must be accompanied by an application data sheet in accordance with 37 CFR 1.76 that identifies each inventor by his or her legal name and by the processing fee required under 37 CFR 1.17(i).

The examiner has required restriction between product or apparatus claims and process claims. Where applicant elects claims directed to the product/apparatus, and all product/apparatus claims are subsequently found allowable, withdrawn process claims that include all the limitations of the allowable product/apparatus claims should be considered for rejoinder. All claims directed to a nonelected process invention must include all the limitations of an allowable product/apparatus claim for that process invention to be rejoined.

In the event of rejoinder, the requirement for restriction between the product/apparatus claims and the rejoined process claims will be withdrawn, and the

Application/Control Number: 15/862,016

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Art Unit: 3733

rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product/apparatus are found allowable, an otherwise proper restriction requirement between product/apparatus claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product/apparatus claim will not be rejoined. See MPEP § 821.04. Additionally, in order for rejoinder to occur, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product/apparatus claims. **Failure to do so may result in no rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

### ***Priority***

Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, 365(c), or 386(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent

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application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112, except for the best mode requirement. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

The disclosure of the prior-filed applications, Application No. 12/471,340, 12/054,335, 11/842,855, 11/536,815, and 60/670,231, fail to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application. Support for the subject matter of claims 2-14 is only found in the disclosures of prior-filed application no. 12/957,776 and 61/265,752. **Accordingly, the effective filing date for claims 2-14 of the current application is 12/01/2009.**

### ***Specification***

Amendment to the specification filed 01/08/2018 has been entered.

The disclosure is objected to because of the following informalities:

[0002], "NTCN's" should be "HTCN's"

[0040], "HTCN 100" should be "HTCN 10"

[0041], "HTCNs 100" should be "HTCNs 10"

[0046], "THCNs" should be "HTCNs"

[0055], "THCNs" should be "HTCNs"

Appropriate correction is required.

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### ***Claim Interpretation***

The following is a quotation of 35 U.S.C. 112(f):

(f) Element in Claim for a Combination. — An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of pre-AIA 35 U.S.C. 112, sixth paragraph:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Claim limitations **“first means for engaging a first cancellous core of the first vertebral body”** and **“second means for engaging a second cancellous core of the second vertebral body”** has/have been interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, because it uses/they use a generic placeholder “first/second means” coupled with functional language “for engaging a first/second cancellous core of the first/second vertebral body” without reciting sufficient structure to achieve the function. Furthermore, the generic placeholder is not preceded by a structural modifier.

Since the claim limitation(s) invokes 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, claim(s) 2-3, 7-14 has/have been interpreted to cover the corresponding structure described in the specification that achieves the claimed function, and equivalents thereof.



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A review of the specification shows that the following appears to be the corresponding structure described in the specification for the 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph limitation:

[0034] *Figures 1E and F illustrate an exemplary embodiment of an HTCN 10 including a fish-hooked tail or portion 18 (embodiment IV). In this embodiment, the tail 18 of the HTCN 10 can include **a series of radially arranged fish-hooks 20 to engage the cancellous core of the vertebral body**. Figure 1F is an enlargement illustrating details of an exemplary embodiment of the radial fish-hook 18.*

[0035] *Figures 1G and H illustrate an exemplary embodiment of an HTCN 10 including a threaded tail-screw 22 (embodiment V). The threaded tail 22 can include **threads 24 that can engage the cancellous core of the vertebral body**. Figure 1H is an enlargement illustrating details of an exemplary embodiment the threads 24.*

If applicant wishes to provide further explanation or dispute the examiner's interpretation of the corresponding structure, applicant must identify the corresponding structure with reference to the specification by page and line number, and to the drawing, if any, by reference characters in response to this Office action.

If applicant does not intend to have the claim limitation(s) treated under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, applicant may amend the claim(s) so that it/they will clearly not invoke 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, or present a sufficient showing that the claim recites/recite sufficient structure, material, or acts for performing the claimed function to preclude application of 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph.

For more information, see MPEP § 2173 *et seq.* and *Supplementary Examination Guidelines for Determining Compliance With 35 U.S.C. 112 and for Treatment of Related Issues in Patent Applications*, 76 FR 7162, 7167 (Feb. 9, 2011).



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***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless —

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim(s) **2, 5-14** is/are rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by Matityahu et al. (US Publication No. 2010/0016903 A1) (from hereon referred to as Matityahu).

RE. Claim 2, Matityahu discloses a spinal fusion implant (Fig. 10) comprising:

a first curvilinear nail-screw (30) which is fully capable of penetration and implantation into a first vertebral body along a first curved trajectory which is fully capable of avoiding pedicles, wherein the first curvilinear nail screw extends from a first proximal end to a first distal end along the first curved trajectory with a first head at the first proximal end and a first bone penetrating pointed tip at the first distal end (see figure below), wherein the first curvilinear nail-screw comprises first means for engaging a first cancellous core of the first vertebral body positioned along a first distal portion of the first curvilinear nail- screw proximate the first distal end (as described in [0043 and 0048], outer surface 78 of the shaft of the anterior portion 86 may be threaded such that it permits screwing of the anterior portion into the vertebral body or may include a

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roughened surface along at least a portion thereof, further head 68 which is proximate the distal end is disclosed as threaded 82 in [0044]);

a second curvilinear nail-screw (30) which is fully capable of penetration and implantation into a second vertebral body along a second curved trajectory that is fully capable of avoiding penetrating pedicles, wherein the second curvilinear nail screw extends from a second proximal end to a second distal end along the second curved trajectory with a second head at the second proximal end and a second bone penetrating pointed tip at the second distal end (see figure below), wherein the second curvilinear nail-screw comprises second means for engaging a second cancellous core of the second vertebral body positioned along a second distal portion of the second curvilinear nail-screw proximate the second distal end (as described in [0043 and 0048], outer surface 78 of the shaft of the anterior portion 86 may be threaded such that it permits screwing of the anterior portion into the vertebral body or may include a roughened surface along at least a portion thereof, further head 68 which is proximate the distal end is disclosed as threaded 82 in [0044]); and

a connecting support structure defining a first hole sized and configured for receiving the first curvilinear nail screw and a second hole sized and configured for receiving the second curvilinear nail screw such that the first curvilinear nail-screw is fully capable of being held with respect to the second curvilinear nail-screw with the first curvilinear nail-screw fully capable of extending into the first vertebral body without penetrating pedicles and the second curvilinear nail-screw fully capable of extending into the second vertebral body without penetrating pedicles.

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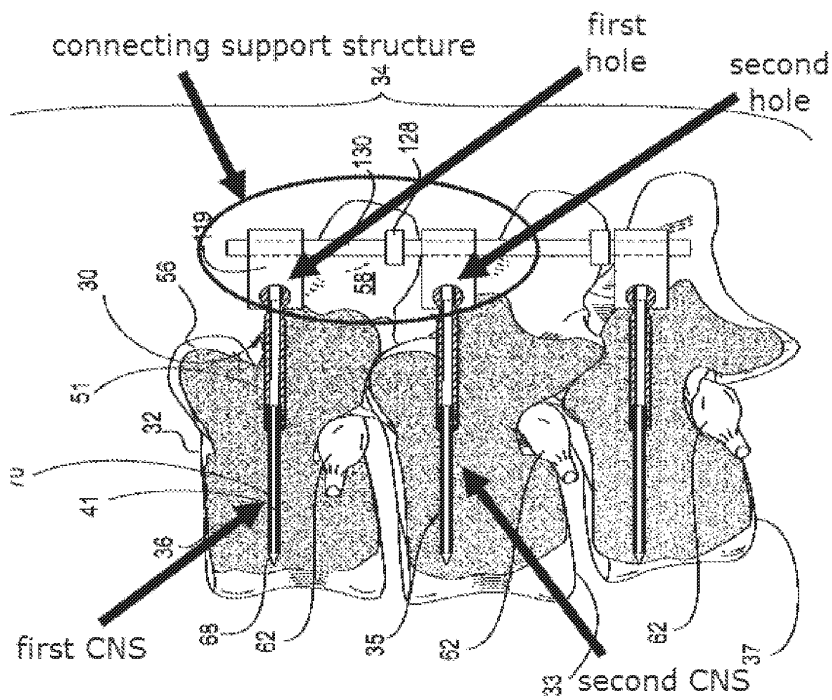
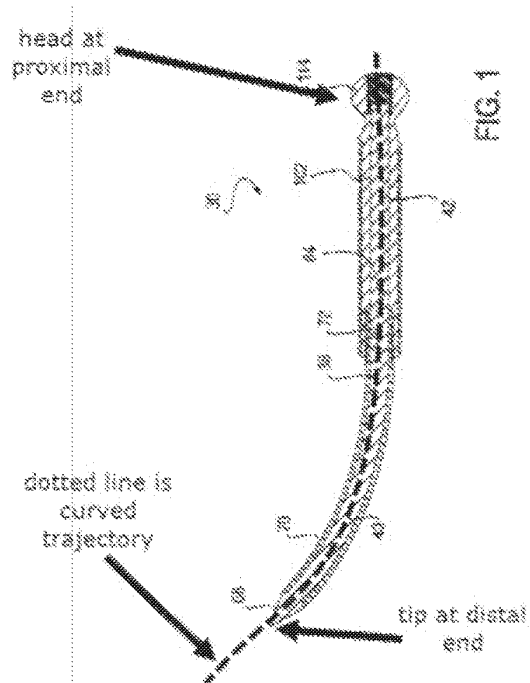


FIG. 10

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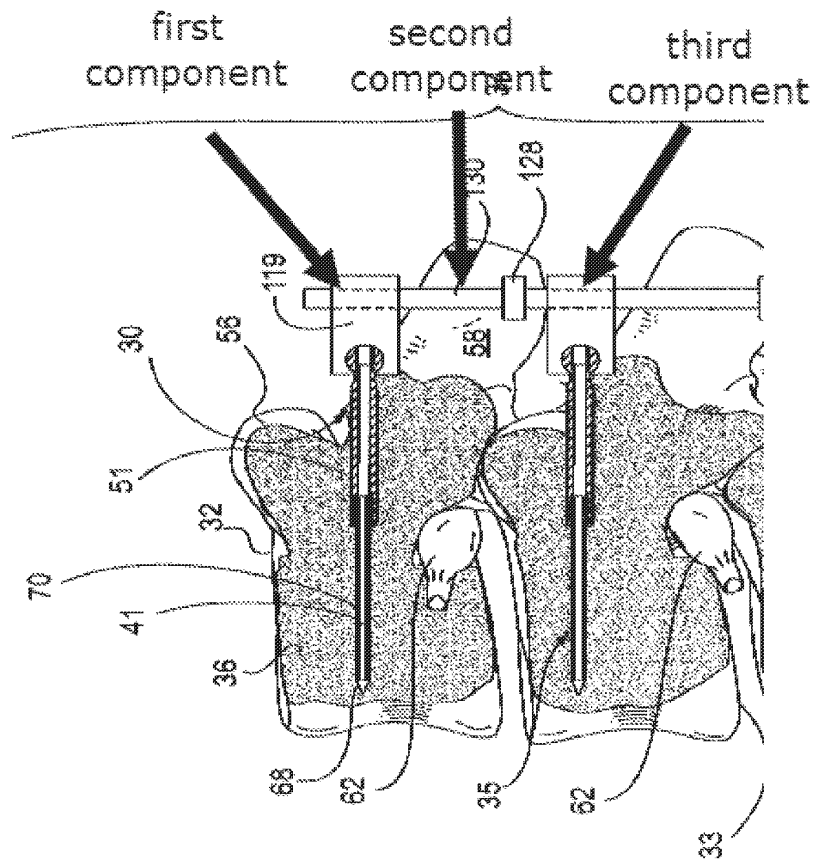
RE. Claim 5, the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise threads [0043, 0044, 0048].

Re. Claim 6, the first curvilinear nail-screw comprises a first smooth portion between the first head and the first distal portion and wherein the second curvilinear nail-screw comprises a second smooth portion between the second head and the second distal portion (CNS are disclosed as having a smooth outer surface 84 at the posterior portion 66 which is in between the anterior portion 86 or portion 68 and the head 114, further neck 116 is located between 68/86 and 114 and is smooth), and wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body each comprise one or more ridges (threads of 68 and 86 are considered ridges).

Re. claim 7-8, the connecting support comprises at least first and second components, wherein the first component defines the first hole for the first curvilinear nail screw, and wherein the first component is connected directly to the second component, wherein the connecting support comprise a third component that defines the second hole for the second curvilinear nail screw and wherein the third component is connected directly to the second component (See figure below).

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Re claim 9, the connecting support structure is a bar (element 130 can be considered a bar as described in [0068]).

Re. claims 10-12, the first and second curvilinear nail- screws are oriented by the connecting support structure to be fully capable of being introduced anteriorly, laterally or posteriorly into the first and second vertebral bodies (first and second CNSs are fully

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capable of being introduced in any direction, including posteriorly, laterally and anteriorly).

Re. claim 13, the first and second heads (114) comprise first and second caps (elements 102 can be considered caps).

Re. Claim 14, the connecting support structure fully capable of being positioned exterior to the first and second vertebral bodies when connecting the first and second curvilinear nail-screws while the first and second curvilinear nail-screws penetrate into the first and second vertebral bodies (shown in Fig. 10).

### ***Claim Rejections - 35 USC § 103***

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims **2-3, 7-14** is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Lieberman (US Publication No. 2003/0181913 A1).

Re. Claim 2, Lieberman discloses a spinal fusion implant (Fig. 11) comprising:

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a first curvilinear nail-screw (50, see figure below) for penetration and implantation into a first vertebral body along a first curved trajectory (curved trajectory is path of helical tunnel as described in [0047]) that avoids penetrating pedicles (shown in Fig. 11 implanted anteriorly, avoiding pedicles), wherein the first curvilinear nail screw extends from a first proximal end to a first distal end along the first curved trajectory with a first head (320) at the first proximal end and a first bone penetrating pointed tip at the first distal end (see figure below),

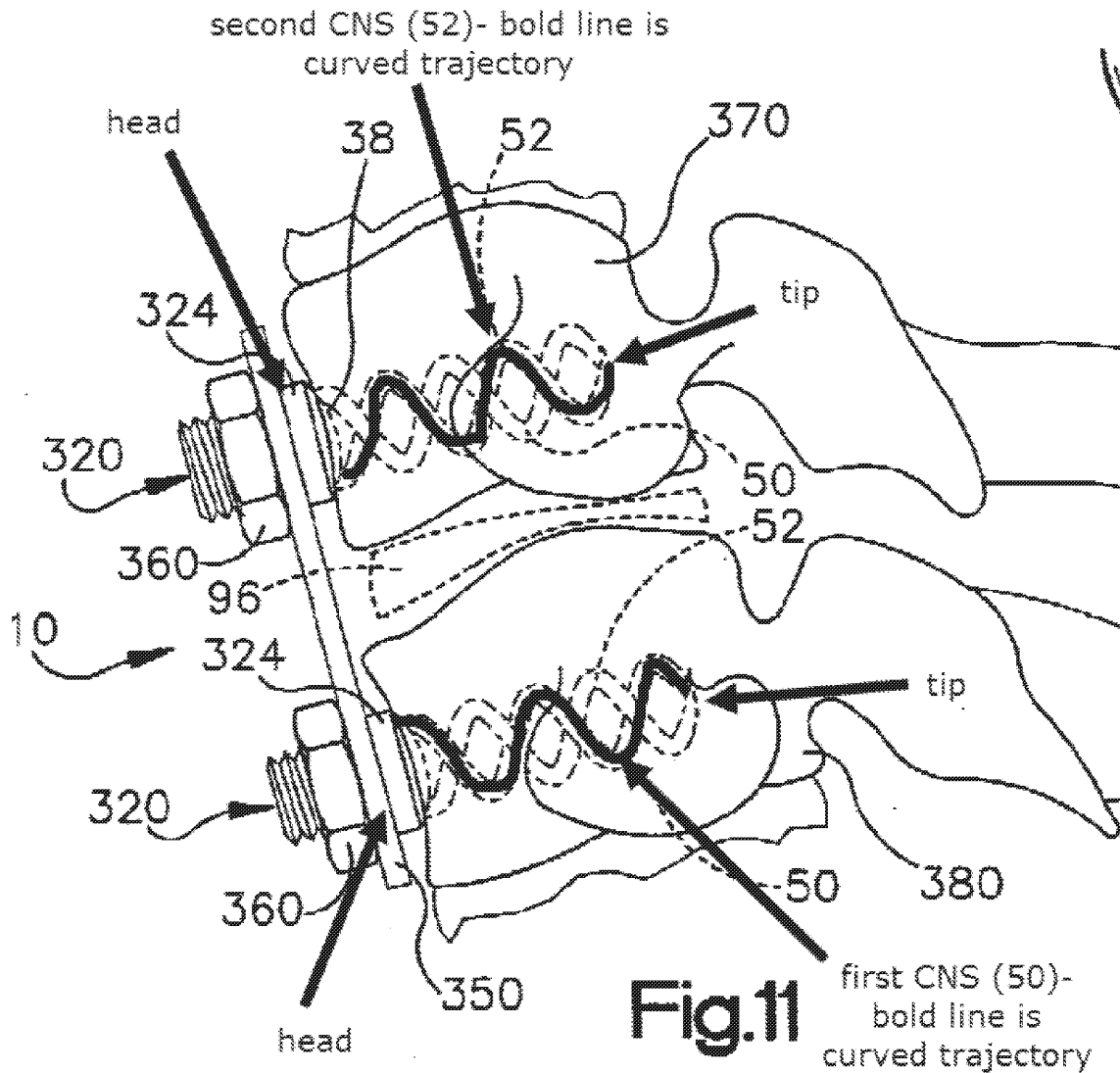
a second curvilinear nail-screw (52, see figure below) for penetration and implantation into a second vertebral body along a second curved trajectory (curved trajectory is path of helical tunnel as described in [0047]) that avoids penetrating pedicles (Fig. 11), wherein the second curvilinear nail screw extends from a second proximal end to a second distal end along the second curved trajectory with a second head (320) at the second proximal end and a second bone penetrating pointed tip at the second distal end (see figure below); and

a connecting support structure (350) defining a first hole (352) sized and configured for receiving the first curvilinear nail screw (Fig. 10-11) and a second hole (354) sized and configured for receiving the second curvilinear nail screw (Fig. 10-11) such that the first curvilinear nail-screw is held with respect to the second curvilinear nail-screw with the first curvilinear nail-screw extending into the first vertebral body without penetrating pedicles and the second curvilinear nail-screw extending into the second vertebral body without penetrating pedicles (configuration shown in Fig. 11).



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Lieberman discloses that the curvilinear nail-screws contain an outer surface which engages the cancellous core of the vertebral bodies in which they are positioned [0047] (shown in Fig. 11), however Lieberman is silent to structure such as fish hooks, threads or equivalents thereof on the curvilinear nail-screws. Lieberman discloses



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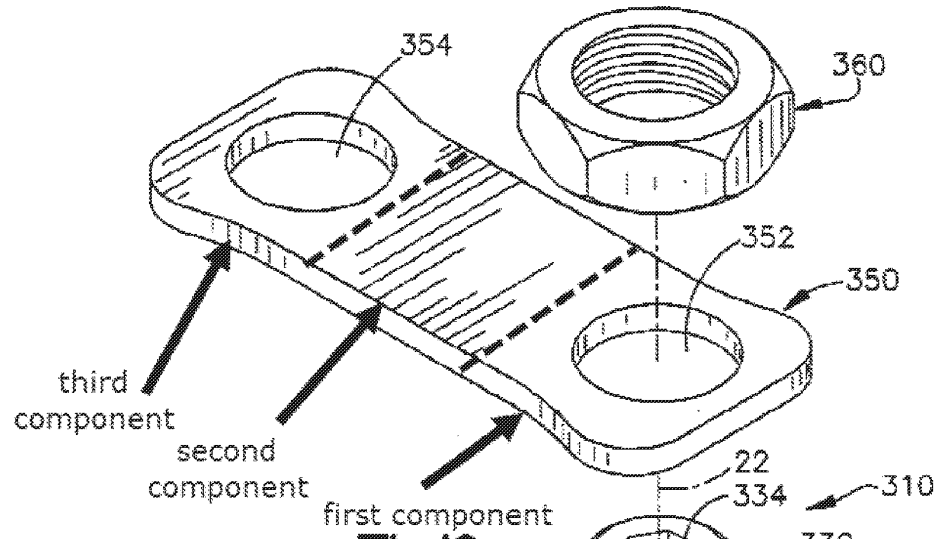
surface treatment on the outer surface of the implant which includes a porous texture, formed by mesh, beads, or a coating such as a ceramic coating that increases the surface area of the end surface to promote bone in-growth and thus help with long term fixation of the anchor to the bone [0034]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the outer surface of the curvilinear nail screws to include a porous texture as taught by Lieberman in order to promote bone ingrowth into the distal portion of the implant and thus help with long term fixation of the anchor within the bone. The porous texture is considered by the Office to be a means for engaging a cancellous core of a vertebral body.

Re. Claim 3, further comprising first and second rotatable connectors (360, 360) configured for retaining the first and second curvilinear nail-screws to the connecting support structure (Fig. 10-11) [0059].

Re. Claim 7-8, the connecting support comprises at least first and second components, wherein the first component defines the first hole for the first curvilinear nail screw, and wherein the first component is connected directly to the second component and the connecting support comprise a third component that defines the second hole for the second curvilinear nail screw and wherein the third component is connected directly to the second component (see figure below).

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Re. Claim 9, the connecting support structure is a bar (shape of 350 shown in Fig. 10 can be considered a bar).

Re. Claim 10, the first and second curvilinear nail- screws are oriented by the connecting support structure to be fully capable of being introduced laterally into the first and second vertebral bodies (first and second CNSs can be introduced in any direction, for example a lateral trajectory is shown in Fig. 3).

Re. Claim 11, the first and second curvilinear nail- screws are oriented by the connecting support structure to be fully capable of being introduced posteriorly into the first and second vertebral bodies (first and second CNSs are fully capable of being introduced in any direction, including posteriorly).

Re. Claim 12, the first and second curvilinear nail- screws are oriented by the connecting support structure to be introduced anteriorly into the first and second

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vertebral bodies (first and second CNSs can be introduced in any direction, for example an anterior trajectory is shown in Fig. 11).

Re. Claim 13, the first and second heads (320, 320) comprise first and second caps (element 330 can be considered a cap or element 360 can be considered a cap, Fig. 10).

Re. Claim 14, the connecting support structure (350) is sized and configured to be positioned exterior to the first and second vertebral bodies when connecting the first and second curvilinear nail-screws while the first and second curvilinear nail-screws (50, 52) penetrate into the first and second vertebral bodies (shown in Fig. 11).

Claim 3 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Matityahu in view of Fanger et al. (US Publication No. 2008/0045951 A1) (from hereon referred to as Fanger).

Matityahu discloses the implant as described in the rejection of claim 2 above. Matityahu discloses that tulip assemblies are used to connect the heads of the CNS to the cross link bar/rod of the connecting support structure [0068]. However, Matityahu is silent to rotatable connectors configured for retaining the first and second curvilinear nail-screws to the connecting support structure.

Fanger discloses a spinal fusion implant in the same field of endeavor which uses locking screws/set screws (70) to tighten a connecting support structure (26) to a tulip (40) and compress the tulip and support structure against the screw head (56) thereby securing the entire screw/tulip/rod assembly together [0062] (Fig. 5). It would

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have been obvious to one having ordinary skill in the art at the time the invention was made to use a set screw (a rotatable connector) to secure the screws with the tulip and connecting support structure as taught by Fanger in order to easily tighten all components with a single tool using a single action thereby locking the orientation of the device relative to the patient.

Claim 4 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Matityahu in view of McGraw et al. (US Publication No. 2008/0033432 A1) (from hereon referred to as McGraw).

Matityahu discloses the implant as described in the rejection of claim 2 above. Matityahu discloses that either or both of the outer surface 78 of the shaft of the anterior portion 86 and the outer surface of 68 may have a roughened surface, however Matityahu is silent to said surfaces comprising radially arranged fish hooks.

McGraw discloses a spinal fusion implant in the same field of endeavor which comprises means for securing the device within the vertebrae which includes barbs or radially arranged fish hooks 32 proximate the distal end 26 of the implant (Fig. 4-5) [0054] for the purpose of stabilizing the implant within the bone. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use barbs or radially arranged fish hooks as taught by McGraw to create the roughened surface described by Matityahu in order to use a means for engaging the bone of the vertebrae known in the art to secure the sections of the implant within the vertebrae thereby preventing movement and loosening of the implant within the body.

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### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See Form PTO-892

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacqueline Johanas whose telephone number is (571)270-5085. The examiner can normally be reached on Monday to Friday, 9:00am to 5:00pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eduardo Robert can be reached on 571-272-4719. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacqueline Johanas/  
Primary Examiner, Art Unit 3733

<b>Examiner-Initiated Interview Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	15/862,016		MOSKOWITZ ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Jacqueline Johanas		3733	

All participants (applicant, applicant's representative, PTO personnel):

(1) Jacqueline Johanas (3) \_\_\_\_\_

(2) Stuart Nelson (Reg. 63947) (4) \_\_\_\_\_

Date of Interview: 12 February 2018.

Type: ☒ Telephonic ☐ Video Conference  
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.  
If Yes, brief description: \_\_\_\_\_

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 2-21.

Identification of prior art discussed: n/a.

**Substance of Interview**  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Examiner called to request oral election between apparatus claims (2-14) and method claims (15-21). Applicant elected apparatus claims without traverse.

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Jacqueline Johanas/ Primary Examiner, Art Unit 3733	
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<b>Notice of References Cited</b>	Application/Control No. 15/862,016	Applicant(s)/Patent Under Reexamination MOSKOWITZ ET AL.	
	Examiner Jacqueline Johanas	Art Unit 3733	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-4,135,506 A	01-1979	Ulrich; Max B.	A61B17/8872	606/207
*	B	US-2003/0181913 A1	09-2003	Lieberman, Isador H.	A61B17/1604	606/325
*	C	US-2008/0033432 A1	02-2008	McGraw; J. Kevin	A61B17/70	606/86A
*	D	US-2010/0016903 A1	01-2010	MATITYAHU; Amir M.	A61B17/866	606/301
*	E	US-7,909,871 B2	03-2011	Abdou; Samy	A61B17/70	606/246
*	F	US-8,617,245 B2	12-2013	Brett; Darrell C.	A61F2/442	623/17.16
*	G	US-9,011,497 B2	04-2015	Ben-Arye; Asaf	A61B17/70	606/246
*	H	US-9,427,270 B2	08-2016	Housman; Mark Edwin	A61B17/8625	1/1
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

**FOREIGN PATENT DOCUMENTS**

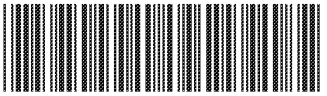
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	N					
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**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



<b>Search Notes</b> 	<b>Application/Control No.</b> 15862016	<b>Applicant(s)/Patent Under Reexamination</b> MOSKOWITZ ET AL.
	<b>Examiner</b> JACQUELINE JOHANAS	<b>Art Unit</b> 3733

CPC- SEARCHED		
Symbol	Date	Examiner
a61b17/7001-7046,7056,7053,8625,86	2/14/2018	JJ
a61b2017/8655	2/14/2018	JJ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

\* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST, inventor searches	2/14/2018	JJ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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EAST Search History

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	15	(US-20100211108-\$ or US-20100094346-\$ or US-20080033432-\$ or US-20030181913-\$ or US-20100016903-\$ or US-20080045951-\$).did. or (US-8951295-\$ or US-8357198-\$ or US-4790303-\$ or US-4274401-\$ or US-8617245-\$ or US-9427270-\$ or US-9011497-\$ or US-4135506-\$ or US-7909871-\$).did.	US-PGPUB; USPAT	OR	ON	2018/02/14 16:40
L3	85	("20010021852"   "20020068977"   "20020143338"   "20040088054"   "20040177531"   "20040254644"   "20050027362"   "20050049590"   "20050177235"   "20050216084"   "20050273170"   "20050278026"   "20070213820"   "20080045951"   "20080188896"   "20090105831"   "20100094346"   "20100145460"   "20100211108"   "2430293"   "4013207"   "4165597"   "4274401"   "4554914"   "4599086"   "4636217"   "4790303"   "4960420"   "4997432"   "5062850"   "5123926"   "5290312"   "5405391"   "5514180"   "5609593"   "5660188"   "5667472"   "5782832"   "5865848"   "5888223"   "5960522"   "6126689"   "6342074"   "6368350"   "6375682"   "6419704"   "6432106"   "6458159"   "6471707"   "6527804"   "6533818"   "6558386"   "6558423"   "6572653"   "6579318"   "6582468"   "6629998"   "6641614"   "6652527"   "6689125"   "6719794"   "6723126"   "6733532"   "6764491"   "6770094"   "6824564"   "6904308"   "6953477"   "6955671"   "6972019"   "7030904"   "7033394"   "7037258"   "7097615"   "7211112"   "7326248"   "7442209"   "7713289"   "7862616"   "7879036"   "8105362"   "8328872"   "8357198"   "8403986"   "8951295").PN.	US-PGPUB; USPAT	OR	ON	2018/02/14 16:40
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S6	4004	a61b17/8625,86.cpc.	US- PGPUB; USPAT	OR	ON	2018/02/13 12:49
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S12	11	("2008/0033432").URPN.	USPAT	OR	ON	2018/02/13 13:49
S13	54	("2003/0181913").URPN.	USPAT	OR	ON	2018/02/13 13:53
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**EAST Search History (Interference)**

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**2/14/2018 4:45:47 PM****C:\Users\jjohanas\Documents\EAST\Workspaces\15862016.wsp**



Receipt date: 01/10/2018

15/862,016 - GAU: 3733

Sheet 1 of 4

Substitute Disclosure Form U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)	Applicant Nathan C. Moskowitz	
	Filing Date January 4, 2018	Group Art Unit

(37 CFR §1.98(b))

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1.	8,105,362	01-2012	Duarte			
	2.	2008/0045951	02-2008	Fanger et al.			
	3.	5,609,593	03-1997	Errico et al.			
	4.	7,713,289	05-2010	Matthys			
	5.	7,879,036	02-2011	Biedermann et al.			
	6.	6,652,527	11-2003	Zucherman et al.			
	7.	4,274,401	06-1981	Miskew			
	8.	2010/0094346	04-2010	Matityahu			
	9.	4,790,303	12-1988	Steffee			
	10.	2,430,293	11-1947	Howells			
	11.	8,357,198	01-2013	McGraw et al.			
	12.	6,689,125	02-2004	Keith et al.			
	13.	5123926	1992-06-23	Pisharodi			
	14.	5514180	1996-05-07	Heggeness et al.			
	15.	6368350	2002-04-09	Erickson et al.			
	16.	6419704	2002-07-16	Ferrec			
	17.	6458159	2002-10-01	Thalgott			
	18.	6527804	2003-03-04	Gauchet et al.			
	19.	6533818	2003-03-18	Weber et al.			
	20.	6579318	2003-06-17	Varga et al.			
	21.	6582468	2003-06-24	Gauchet			
	22.	6719794	2004-04-13	Gerber			
	23.	6733532	2004-05-11C	Gauchet et al.			
	24.	6764491	2004-07-20	Frey et al.			
	25.	6770094	2004-08-03	Fehling et al.			
	26.	6572653	2003-06-03	Simonson			

Examiner Signature /JACQUELINE T JOHANAS/	Date Considered 02/13/2018
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

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MOSKOWITZ-00000137

JTX-011.0137

Receipt date: 01/10/2018

15/862,016 - GAU: 3733

Sheet 2 of 4

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)  (37 CFR §1.98(b))		Applicant Nathan C. Moskowitz	
		Filing Date January 4, 2018	Group Art Unit

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	27.	5782832	1998-07-21	Larsen et al.			
	28.	6641614	2003-11-04	Wagner et al.			
	29.	6126689	2000-10-03	Brett			
	30.	6375682	2002-04-23	Fleischmann et al.			
	31.	6723126	2004-04-20	Berry			
	32.	5667472	1997-09-07	Finn et al.			
	33.	6955671	2005-10-18	Uchikubo			
	34.	7037258	2006-05-02	Chatenever et al.			
	35.	6904308	2005-06-07	Frisch et al.			
	36.	7097615	2006-08-29	Banik et al.			
	37.	7030904	2006-04-18	Adair et al.			
	38.	4997432	1991-03-05	Keller			
	39.	5960522	1999-10-05	Boe			
	40.	5660188	1997-08-26	Groiso			
	41.	4960420	1990-10-02	Goble et al.			
	42.	4636217	1987-01-13	Ogilvie et al.			
	43.	4554914	1985-11-26	Kapp et al.			
	44.	6953477	2005-10-11	BERRY			
	45.	4599086	1986-07-08	DOTY			
	46.	5062850	1991-11-05	MACMILLAN et al.			
	47.	5290312	1994-03-01	KOJIMOTO et al.			
	48.	5865848	1999-02-02	Baker			
	49.	7211112	2007-05-01	Baynham et al.			
	50.	5405391	1995-04-11	Henderson et al.			
	51.	7862616	2011-01-04	Lechmann et al.			
	52.	6972019	2005-12-06	Michelson			

Examiner Signature  /JACQUELINE T JOHANAS/	Date Considered  02/13/2018
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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MOSKOWITZ-00000138

JTX-011.0138

Receipt date: 01/10/2018

15/862,016 - GAU: 3733

Sheet 3 of 4

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary)		Applicant Nathan C. Moskowitz	
		Filing Date January 4, 2018	Group Art Unit
(37 CFR §1.98(b))			

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	53.	6629998	2003-10-07	Lin			
	54.	6824564	2004-11-30	Crozet			
	55.	7442209	2008-10-28	Michelson			
	56.	6342074	2002-01-29	Simpson			
	57.	6558423	2003-05-06	Michelson			
	58.	6432106	2002-08-13	Fraser			
	59.	7326248	2008-02-05	Michelson			
	60.	7033394	2006-04-25	Michelson			
	61.	5888223	1999-03-30	Bray, Jr.			
	62.	8403986	2013-03-26	Michelson			
	63.	8328872	2012-12-11	Duffield et al.			
	64.	20040088054	2004-05-06	Berry			
	65.	20050273170	2005-12-08	Navarro et al.			
	66.	20040177531	2004-09-16	DiBenedetto et al.			
	67.	20050278026	2005-12-15	Gordon, et al.			
	68.	20050216084	2005-09-29	Fleischmann			
	69.	20050027362	2005-02-03	Williams et al.			
	70.	20050049590	2005-03-03	Alleyne et al.			
	71.	20040254644	2004-12-16	Taylor			
	72.	20020143338	2002-10-03	ORBAY et al.			
	73.	20050177235	2005-08-11	BAYNHAM et al.			
	74.	20020068977	2002-06-06	JACKSON			
	75.	20070213820	2007-09-13	MAGERL et al.			
	76.	20100145460	2010-06-10	McDonough et al.			
	77.	20090105831	2009-04-23	Jones et al.			
	78.	8951295	2/2015	Matityahu et al.			

Examiner Signature  /JACQUELINE T JOHANAS/	Date Considered 02/13/2018
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form

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MOSKOWITZ-00000139

JTX-011.0139



Receipt date: 01/10/2018

15/862,016 - GAU: 3733

Sheet 4 of 4

Substitute Disclosure Form	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 45335-0013002	Application No. 15/862,016
<b>Information Disclosure Statement by Applicant</b> (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Nathan C. Moskowitz	
		Filing Date January 4, 2018	Group Art Unit

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	79.	20010021852	9/2001	Chappius			
	80.	20080188896	8/2008	Sevrain			
	81.	6471707	10/2002	Miller et al.			
	82.	6558386	5/2003	Cragg			
	83.	20100211108	8/2010	Lemole			
	84.	4013207	3/1977	ErkenBrack			
	85.	4165597	8/1979	Scanland et al			

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	86.	2004093749	2004-11-04	WO				
	87.	2006091503	2006-08-31	WO				

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	88.	Vincent C. TRAYNELIS, "Prosthetics and Biologics: The Wave of the Future," CLINICAL NEUROSURGERY, Volume 50, Proceedings of the Congress of Neurological Surgeons, Philadelphia, PA 2002, Chapter 9, pages 207-219
	89.	E.K. WAI et al., "Disk Replacement Arthroplasties: Can The Success of Hip and Knee Replacements be Repeated in the Spine?," Seminars in Spine Surgery, Vol. 15, No. 4 (December) 2003, pp 473-482
	90.	Richard D. GUYER et al., "Intervertebral Disc Prostheses," SPINE JOURNAL, Volume 28, Number 15S, Supp. To 8/1/03, pages S15-S23
	91.	DIETER GROB et al., "Clinical Experience With the Dynesys Semirigid Fixation System for the Lumbar Spine," SPINE, Vol. 30, No. 3, 2005, pp. 324-331
	92.	International Search Report (ISR) and Written Opinion of the International Searching Authority, 03 December 2007, International Application No. PCT/US 07/05005
	93.	International Search Report (ISR) and Written Opinion of the International Searching Authority, 21 May 2008, International Application No. PCT/US2007/021015
	94.	International Search Report (ISR) and Written Opinion of the International Searching Authority, 09 July 2008, International Application No. PCT/US2007021013

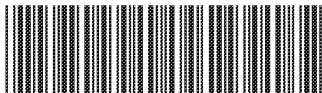
Examiner Signature <b>/JACQUELINE T JOHANAS/</b>	Date Considered <b>02/13/2018</b>
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.T.J/

MOSKOWITZ-00000140

**JTX-011.0140**

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 15862016	<b>Applicant(s)/Patent Under Reexamination</b> MOSKOWITZ ET AL.
	<b>Examiner</b> JACQUELINE JOHANAS	<b>Art Unit</b> 3733

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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CLAIM		DATE							
Final	Original	02/14/2018							
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	3	✓							
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	5	✓							
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	16	N							
	17	N							
	18	N							
	19	N							
	20	N							
	21	N							

**Bibliographic Data**

Application No: 15862016

Foreign Priority claimed:

☐ Yes ☒ No

35 USC 119 (a-d) conditions met:

☐ Yes ☒ No☐ Met After Allowance

Verified and Acknowledged:

/jacqueline johanas/

Examiner's Signature

Initials

Title:

HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-  
SCREWS WITH INTER-LOCKING RIGID OR JOINTED  
FLEXIBLE RODS FOR SPINAL FUSION

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FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
01/04/2018	606	3733	45335-0013002
<b>RULE</b>			

**APPLICANTS**

Nathan C. Moskowitz, Rockville, MD, UNITED STATES

**INVENTORS**

Nathan C. Moskowitz, Rockville, MD, UNITED STATES

Mosheh T. Moskowitz, Rockville, MD, UNITED STATES

Ahmnon D. Moskowitz, Rockville, MD, UNITED STATES

**CONTINUING DATA**

This application is a CON of 12957776 12/01/2010 PAT 9888918

12957776 has PRO of 61265752 12/01/2009

12957776 is a CIP of 12471340 05/22/2009 PAT 8734516

12471340 is a CIP of 12054335 03/24/2008 PAT 7972363

12054335 is a CIP of 11842855 08/21/2007 PAT 7942903

11842855 is a CIP of 11536815 09/29/2006 PAT 7846188

11536815 is a CIP of 11208644 08/23/2005 PAT 7704279

12957776 has PRO of 60670231 04/12/2005

**FOREIGN APPLICATIONS****IF REQUIRED, FOREIGN LICENSE GRANTED\*\***

01/26/2018

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/862,016	01/04/2018	Nathan C. Moskowitz	45335-0013002

CONFIRMATION NO. 6203

26191

FISH & RICHARDSON P.C. (TC)  
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 MINNEAPOLIS, MN 55440-1022

## PUBLICATION NOTICE



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**Title:** HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION

**Publication No.** US-2018-0125483-A1

**Publication Date:** 05/10/2018

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Attorney Docket No.: 46440-0013002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor :	Nathan C. Moskowitz	Art Unit :	3733
Serial No. :	15/862,016	Examiner :	Jacqueline T. Johanas
Filed :	January 4, 2018	Conf. No. :	6203
Title :	HORIZONTAL-TRANSVERSEBRAL CURVILINEAR NAIL- SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

**Mail Stop Amendment**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

REPLY TO ACTION OF FEBRUARY 21, 2018

Please consider the following reply.

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 2 of 13

Attorney Docket: 46440-0013002

Amendments to the Title:

Please replace the Title with the following amended Title:

SPINAL FUSION IMPLAINT WITH CUNVILINEAR NAIL-SCREWS

First Named Inventor : Nathan C. Moskowitz  
 Serial No. : 15/862,016  
 Filed : January 4, 2018  
 Page : 3 of 13

Attorney Docket: 46440-0013002

Amendment to the Specification:

Please amend paragraphs 0002, 0040, 0041, 0046, and 0055 as follows:

[0002] The present invention relates to a unique universal horizontal-transvertebral curvilinear nail-screw (HTCN) and to a method of applying such an HTCN to the spine, whereby a series of ~~NTCN's~~ HTCN's, according to the exemplary embodiments, can be implanted into adjacent vertebrae can be inter-connected with either rigid or flexible jointed rods, fusing two or more adjacent vertebral bodies together thereby achieving either rigid or flexible fusion, respectively, and thus obviating the need for pedicle screw fixation in many but not all cases. The exemplary embodiments also can be used to salvage and/or extend pre-existing pedicle screw fusions.

[0040] Figures 3A-D exemplarily illustrate the placement of a total of four HTCNS 10 into two adjacent non-transparent vertebral bodies 100 in order to achieve fusion of these two adjacent bodies. A first HTCN 10 is inserted unilaterally into the right nontransparent vertebral body 100, a second HTCN 10 is inserted unilaterally into the left non-transparent vertebral body 100, a third HTCN ~~[[100]]~~ 10 is inserted into the adjacent right non-transparent vertebral body 100, and a fourth HTCN 10 is inserted into the adjacent left non-transparent vertebral body 100. In the exemplary embodiment illustrated in Figures 3A-D, two of the HTCNS 10 are lined up on the right, and two of the HTCNS 10 are lined up on the left. The path of the curvilinear HTCNS 10 begins posteriorly, and its trajectory is horizontal from its entry point into the mid lateral vertebral body 100 to its final destination which is the relative center of the vertebral body 100.

[0041] The HTCNS ~~[[100]]~~ 10 are illustrated as perforating the transverse processes 102. Figures 3A-D illustrate an example of an estimated trajectory and orientation for avoiding (e.g., necessary to avoid) exiting nerve roots. In other embodiments, the entry point of the HTCN 10 can be more medial, lateral, caudal, or rostral to the transverse process 102. The initial position of insertion may be via posterior, lateral, or anterior surgical approaches.



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[0046] The exemplary embodiment is illustrated with two HTCNs 10 per connecting bar 30. However, one of ordinary skill in the art will recognize that more than two ~~[[THCNs]]~~ HTCNs 10 can be coupled to each connecting bar 30. Furthermore, the threading on the connecting bar 30 is not limited to the illustrated embodiment and can extend along a portion or all of the length of the connecting bar 30. For example, in an alternative embodiment, three or more nuts 34 can be secured to the threaded connecting bar 30 to secure two or more connecting bar links 34 (e.g., three or four links 34, etc.) to the connecting bar 30, such that two or more HTCNs 10 (e.g., three or four HTCNs 10, etc.) can be coupled to the same connecting bar 30. The diameter of the connecting bar 30 is illustrated as being uniform along a length of the connecting bar 30. However, other embodiments are possible in which the diameter of the body of the connecting bar 30, the diameter of the threads, etc. can be different at different portions of the connecting bar 30. Other embodiments can include more than two connecting bar links 32, and more than two tightening nuts 34.

[0055] The exemplary embodiment is illustrated with two HTCNs 10 per connecting bar 40. However, in alternative embodiments, more than two ~~[[THCNs]]~~ HTCNs 10 can be coupled to each connecting bar 40. Furthermore, the threading 48 on the connecting bar 40 is not limited to the illustrated embodiment. For example, in an alternative embodiment, three or more nuts 34 can be secured to the threaded connecting bar 40 to secure two or more connecting bar links 34 (e.g., three or four links 34, etc.) to the connecting bar 40, such that two or more HTCNs 10 (e.g., three HTCNs 10) can be coupled to the same connecting bar 40. Other embodiments can include more than two connecting bar links 32, and more than two tightening nuts 34.

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List of claims (replacing prior versions).

1. (Cancelled)

2. (Currently Amended) A spinal fusion implant comprising:

a first curvilinear nail-screw for penetration and implantation into a first vertebral body along a first curved trajectory that avoids penetrating pedicles, wherein the first curvilinear nail screw extends from a first proximal end to a first distal end along the first curved trajectory with a first head at the first proximal end and a first bone penetrating pointed tip at the first distal end, wherein the first curvilinear nail-screw comprises first means for engaging a first cancellous core of the first vertebral body positioned along a first distal portion of the first curvilinear nail-screw proximate the first distal end, wherein the first curved trajectory is along a first single continuous arc;

a second curvilinear nail-screw for penetration and implantation into a second vertebral body along a second curved trajectory that avoids penetrating pedicles, wherein the second curvilinear nail screw extends from a second proximal end to a second distal end along the second curved trajectory with a second head at the second proximal end and a second bone penetrating pointed tip at the second distal end, wherein the second curvilinear nail-screw comprises second means for engaging a second cancellous core of the second vertebral body positioned along a second distal portion of the second curvilinear nail-screw proximate the second distal end, wherein the second curved trajectory is along a second single continuous arc; and

a connecting support structure defining a first hole sized and configured for receiving the first curvilinear nail screw and a second hole sized and configured for receiving the second curvilinear nail screw such that the first curvilinear nail-screw is held with respect to the second curvilinear nail-screw with the first

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curvilinear nail-screw extending into the first vertebral body without penetrating pedicles and the second curvilinear nail-screw extending into the second vertebral body without penetrating pedicles.

3. (Previously Presented) The spinal fusion implant of claim 2, and further comprising first and second rotatable connectors configured for retaining the first and second curvilinear nail-screws to the connecting support structure.

4. (Previously Presented) The spinal fusion implant of claim 2, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise radially arranged fish-hooks.

5. (Previously Presented) The spinal fusion implant of claim 2, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise threads.

6. (Previously Presented) The spinal fusion implant of claim 2, wherein the first curvilinear nail-screw comprises a first smooth portion between the first head and the first distal portion and wherein the second curvilinear nail-screw comprises a second smooth portion between the second head and the second distal portion, and wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body each comprise one or more ridges.

7. (Currently Amended) The spinal fusion implant of claim 2, wherein the connecting support comprises at least first and second separate components, wherein the first component defines the first hole for the first curvilinear nail screw, and wherein the first component is connected directly to the second component.

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8. (Previously Presented) The spinal fusion implant of claim 7, wherein the connecting support comprise a third component that defines the second hole for the second curvilinear nail screw and wherein the third component is connected directly to the second component.

9. (Previously Presented) The spinal fusion implant of claim 2, wherein the connecting support structure is a bar.

10. (Previously Presented) The spinal fusion implant of claim 2, wherein the first and second curvilinear nail-screws are oriented by the connecting support structure to be introduced laterally into the first and second vertebral bodies.

11. (Previously Presented) The spinal fusion implant of claim 2, wherein the first and second curvilinear nail-screws are oriented by the connecting support structure to be introduced posteriorly into the first and second vertebral bodies.

12. (Previously Presented) The spinal fusion implant of claim 2, wherein the first and second curvilinear nail-screws are oriented by the connecting support structure to be introduced anteriorly into the first and second vertebral bodies.

13. (Previously Presented) The spinal fusion implant of claim 2, wherein the first and second heads comprise first and second caps.

14. (Previously Presented) The spinal fusion implant of claim 2, wherein the connecting support structure is sized and configured to be positioned exterior to the first and second vertebral bodies when connecting the first and second curvilinear nail-screws while the first and second curvilinear nail-screws penetrate into the first and second vertebral bodies.

15. (Withdrawn, Currently Amended) A method of implanting a spinal fusion implant, the method comprising:

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implanting a first curvilinear nail-screw to penetrate into a first vertebral body along a first curved trajectory that avoids pedicles, wherein the first curvilinear nail screw extends from a first proximal end to a first distal end along the first curved trajectory with a first head at the first proximal end and a first bone penetrating pointed tip at the first distal end, wherein the first curvilinear nail-screw comprises first means for engaging a first cancellous core of the first vertebral body positioned along a first distal portion of the first curvilinear nail-screw proximate the first distal end, wherein the first head is positioned exterior to the first vertebral body and the first distal portion is positioned in the first cancellous core when implanted, wherein the first curved trajectory is along a first single continuous arc;

implanting a second curvilinear nail-screw to penetrate into a second vertebral body along a second curved trajectory that avoids pedicles, wherein the second curvilinear nail screw extends from a second proximal end to a second distal end along the second curved trajectory with a second head at the second proximal end and a second bone penetrating pointed tip at the second distal end, wherein the second curvilinear nail-screw comprises second means for engaging a second cancellous core of the second vertebral body positioned along a second distal portion of the second curvilinear nail-screw proximate the second distal end, wherein the second head is positioned exterior to the second vertebral body and the second distal portion is positioned in the second cancellous core when implanted, wherein the second curved trajectory is along a second single continuous arc;

connecting the first curvilinear nail-screw to the second curvilinear nail-screw via a connecting support structure such that the first curvilinear nail-screw is held with respect to the second curvilinear nail-screw with the first curvilinear nail-screw extending into the first vertebral body without penetrating pedicles and the second curvilinear nail-screw extending into the second vertebral body without penetrating pedicles.

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16. (Withdrawn) The method of claim 15, wherein the first curvilinear nail-screw penetrates into the first vertebral body so as to traverse no more than 50% of the first vertebral body and the second curvilinear nail-screw penetrates into the second vertebral body so as to traverse no more than 50% of the second vertebral body.

17. (Withdrawn) The method of claim 15, wherein the first and second curvilinear nail-screws penetrate into the first and second vertebral bodies without traversing an intervertebral disk.

18. (Withdrawn) The method of claim 15, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise radially arranged fish-hooks.

19. (Withdrawn) The method of claim 15, wherein the first means for engaging a first cancellous core of the first vertebral body and the second means for engaging a second cancellous core of the second vertebral body comprise threads.

20. (Withdrawn) The method of claim 15, wherein the first and second curvilinear nail-screws are introduced laterally into the first and second vertebral bodies.

21. (Withdrawn) The method of claim 15, wherein the first and second curvilinear nail-screws are introduced anteriorly into the first and second vertebral bodies.

22. (New) The spinal fusion implant of claim 2, wherein the first curvilinear nail-screw shares a first centerline axis with the first hole where the first curvilinear nail-screw extends through the first hole and wherein the second curvilinear nail-screw shares a second centerline axis with the second hole where the second curvilinear nail-screw extends through the second hole.

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23. (New) The spinal fusion implant of claim 2, wherein the first and second curvilinear nail-screws connect to the first and second holes of the support structure at curved portions of the first and second curvilinear nail-screws.

24. (New) The spinal fusion implant of claim 2, wherein the first curvilinear nail-screw is curved from the first proximal end to the first distal end including a portion of the first curvilinear nail-screw connected to the connecting support structure and the second curvilinear nail-screw is curved from the second proximal end to the second distal end including a portion of the second curvilinear nail-screw connected to the connecting support structure.



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### REMARKS

With this amendment, claims 2, 7, and 15 are amended without prejudice and claims 22-24 are added.

### Examiner Interview

On May 15, 2018 an Examiner Interview was conducted between Examiner Jacqueline Johanas for the USPTO and Stuart A. Nelson for the Applicant. During the interview, the parties discussed differences between the claim language and the cited references. The parties also discussed potential claim amendments. It was agreed that the claims as amended distinguish over the cited references.

### Specification

The specification has been amended to address the issues identified by the Examiner regarding paragraphs 0002, 0040, 0041, 0046, and 0055.

### Claim Rejections - 35 USC § 102 and 103

Claims 2, 5-14 were rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by Matityahu et al. (US Publication No. 2010/0016903) (referred to as Matityahu). Claims 2-3, 7-14 were rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Lieberman (US Publication No. 2003/0181913) (referred to as Lieberman). Claim 3 was rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Matityahu in view of Fanger et al. (US Publication No. 2008/0045951) (referred to as Fanger). Claim 4 was rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Matityahu in view of McGraw et al. (US Publication No. 2008/0033432) (referred to as McGraw).

Without conceding the merits of the rejection but to further prosecution, claim 2 has been amended to require that “the first curved trajectory is along a first single continuous arc” and “the second curved trajectory is along a second single continuous arc.” As agreed during the Examiner Interview, these features (particularly as combined with the other features of claim 2)



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are not taught by Matityahu or Lieberman. Accordingly, claim 2 and all claims depending therefrom are patentable over the cited references for at least this reason.<sup>1</sup>

*Request for Reconsideration*

The Applicant respectfully requests prompt consideration and a Notice of Allowance. In the event that no Notice of Allowance will be provided in the next communication, Applicant requests that the Examiner telephone the undersigned attorney (612-337-2538) prior to the next communication so that prosecution on the merits may be expedited. It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendments herein do not signify concession of unpatentability of any claims prior to this amendment. Applicant hereby specifically reserves the right to prosecute the previously presented subject matter in a continuing application. Also, Applicant expressly reserves the right to prosecute claims of different or broader scope in a continuing application. The Patent Office should infer no (i) adoption of a position with respect to patentability, (ii) change in the Applicant's position with respect to any claim or subject matter of the invention, or (iii) acquiescence in any way to any position taken by the Office Action, based on the amendments made herein.

Please apply necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

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<sup>1</sup> While Applicant maintains that the claims are patentable for additional reasons as well, this response will focus on the reasons discussed and agreed upon during the May 15, 2018 Examiner Interview.

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 13 of 13

Attorney Docket: 46440-0013002

Respectfully submitted,

Date: 5/16/2018

/Stuart A. Nelson/  
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Electronic Acknowledgement Receipt	
EFS ID:	32641439
Application Number:	15862016
International Application Number:	
Confirmation Number:	6203
Title of Invention:	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION
First Named Inventor/Applicant Name:	Nathan C. Moskowitz
Customer Number:	26191
Filer:	Stuart A. Nelson/Abby Remer
Filer Authorized By:	Stuart A. Nelson
Attorney Docket Number:	45335-0013002
Receipt Date:	16-MAY-2018
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Application Type:	Utility under 35 USC 111(a)

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1		Response.pdf	129272	yes	13
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Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Amendment/Req. Reconsideration-After Non-Final Reject	1	1	
Specification	2	4	
Claims	5	10	
Applicant Arguments/Remarks Made in an Amendment	11	13	

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**New Applications Under 35 U.S.C. 111**  
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**  
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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Attorney Docket No.: 46440-0013002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor :	Nathan C. Moskowitz	Art Unit :	3733
Serial No. :	15/862,016	Examiner :	Jacqueline T. Johanas
Filed :	January 4, 2018	Conf. No. :	6203
Title :	HORIZONTAL-TRANSVERSEBRAL CURVILINEAR NAIL- SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION		

**Mail Stop Amendment**

Commissioner for Patents  
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REPLY TO ACTION OF FEBRUARY 21, 2018

Please consider the following reply.

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 2 of 3

Attorney Docket: 46440-0013002

Amendments to the Title:

Please replace the Title with the following amended Title:

SPINAL FUSION IMPLANT WITH CURVILINEAR NAIL-SCREWS

First Named Inventor : Nathan C. Moskowitz  
Serial No. : 15/862,016  
Filed : January 4, 2018  
Page : 3 of 3

Attorney Docket: 46440-0013002

REMARKS

This Reply supplements the Reply dated 5/16/2018. This Reply is provided to amend the Title to correct spelling errors introduced in the Reply of 5/16/2018.

Apply any necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: 5/17/2018

/Stuart A. Nelson/  
Stuart A. Nelson  
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Electronic Acknowledgement Receipt	
EFS ID:	32649574
Application Number:	15862016
International Application Number:	
Confirmation Number:	6203
Title of Invention:	HORIZONTAL-TRANSVERTEBRAL CURVILINEAR NAIL-SCREWS WITH INTER-LOCKING RIGID OR JOINTED FLEXIBLE RODS FOR SPINAL FUSION
First Named Inventor/Applicant Name:	Nathan C. Moskowitz
Customer Number:	26191
Filer:	Stuart A. Nelson/Abby Remer
Filer Authorized By:	Stuart A. Nelson
Attorney Docket Number:	45335-0013002
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Application Type:	Utility under 35 USC 111(a)

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1		Response.pdf	78908	yes	3
			5b470c7f998d6fe8653f0310239ca50a3e485097		



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	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
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## UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/862,016	01/04/2018	Nathan C. Moskowitz	45335-0013002	6203

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FISH & RICHARDSON P.C. (TC)		
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MINNEAPOLIS, MN 55440-1022		

EXAMINER	
JOHANAS, JACQUELINE T	

ART UNIT	PAPER NUMBER
3733	

NOTIFICATION DATE	DELIVERY MODE
05/21/2018	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

<b><i>Applicant-Initiated Interview Summary</i></b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	15/862,016	MOSKOWITZ ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jacqueline Johanas	3733	

All participants (applicant, applicant's representative, PTO personnel):

(1) Jacqueline Johanas. (3) \_\_\_\_\_.

(2) Stuart Nelson (reg. 63947). (4) \_\_\_\_\_.

Date of Interview: 15 May 2018.

Type: ☒ Telephonic ☐ Video Conference  
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.  
If Yes, brief description: \_\_\_\_\_.

Issues Discussed ☐101 ☐112 ☒102 ☒103 ☐Others  
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 2.

Identification of prior art discussed: Matityahu et al. (US Publication No. 2010/0016903 A1), Lieberman (US Publication No. 2003/0181913 A1).

Substance of Interview  
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

See Continuation Sheet.

**Applicant recordation instructions:** The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Jacqueline Johanas/ Primary Examiner, Art Unit 3733	
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## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation Sheet (PTOL-413)

Application No. 15/862,016

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments:

Mr. Nelson discussed how Matityahu is only disclosed as a pedicle screw and used through the pedicle whereas Applicant's invention bypasses the pedicle. Examiner maintained that the nail-screw of Matityahu was fully capable of being placed in a different location rather than through the pedicle (e.g. caudally as to avoid the pedicle, at an angle so as to engage the transverse process and then through the vertebral body, etc.) and that the functional claim language reciting avoiding pedicles was insufficient to overcome Matityahu. Mr. Nelson discussed how structurally his nail-screw was different from Matityahu as his nail-screw was "continuously" curved from proximal to distal end while the screw of Matityahu had a straight portion (shown as portion 42 in Fig. 1 of Matityahu). Examiner agreed that this was a structural distinction between the prior art and Applicant's invention.

Mr. Nelson discussed the rejection of claim 2 using the Lieberman reference. Mr. Nelson argued the modification: that one of ordinary skill in the art would not find it obvious to modify the smooth corkscrew with a surface feature such as porous texture because it would impart too much frictional force upon insertion which could damage the patient's tissue and/or hinder insertion of the device. Examiner understood Mr. Nelson's argument however felt that she could provide an evidentiary reference which discusses equivalent modifications in the same field of endeavor/analogous art. Examiner stated that increasing bone ingrowth/preventing back out and overall enhancing security of the implant in the bone was a common motivation in the art for adding such surface features. Further, Examiner stated that porosities allowing bone ingrowth need not be large openings and could be on the scale of micro/nanometers which would not impart much additional friction.

Mr. Nelson brought up the concept that the curved trajectory of extends from the first proximal which contains the head while it appears that in the device of Lieberman, the trajectory ends at the head. Examiner recommended amending the claim to clarify that the first and second trajectories of the first and second curvilinear nail-screws were "single continuous arc" shaped trajectories. This claim limitation would overcome the Matityahu reference as the trajectory of the nail-screw of Matityahu wasn't a "continuous arc" from the proximal to the distal end due to the straight portion and would also overcome the Lieberman reference as the trajectory of the corkscrew shape of Lieberman could not be considered a "single arc" from the proximal to the distal end.

Mr. Nelson stated that he would run this proposed amendment past his client. Examiner invited Mr. Nelson to call back if there was an alternative amendment that was proposed by the client.





## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
 United States Patent and Trademark Office  
 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

26191 7590 06/18/2018  
 FISH & RICHARDSON P.C. (TC)  
 PO BOX 1022  
 MINNEAPOLIS, MN 55440-1022

EXAMINER

JOHANAS, JACQUELINE T

ART UNIT

PAPER NUMBER

3733

DATE MAILED: 06/18/2018

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/862,016	01/04/2018	Nathan C. Moskowitz	45335-0013002	6203

TITLE OF INVENTION: SPINAL FUSION IMPLANT WITH CURVILINEAR NAIL-SCREWS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0	\$0	\$500	09/18/2018

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

## HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER:** Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at [www.uspto.gov/PatentMaintenanceFees](http://www.uspto.gov/PatentMaintenanceFees).

## PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or **Fax** (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26191 7590 06/18/2018  
 FISH & RICHARDSON P.C. (TC)  
 PO BOX 1022  
 MINNEAPOLIS, MN 55440-1022

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/862,016	01/04/2018	Nathan C. Moskowitz	45335-0013002	6203

TITLE OF INVENTION: SPINAL FUSION IMPLANT WITH CUNVILINEAR NAIL-SCREWS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0	\$0	\$500	09/18/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
JOHANAS, JACQUELINE T	3733	606-264000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/862,016	01/04/2018	Nathan C. Moskowitz	45335-0013002	6203
26191	7590	06/18/2018	EXAMINER	
FISH & RICHARDSON P.C. (TC)			JOHANAS, JACQUELINE T	
PO BOX 1022			ART UNIT	
MINNEAPOLIS, MN 55440-1022			PAPER NUMBER	

3733

DATE MAILED: 06/18/2018

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.



### OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b> 15/862,016	<b>Applicant(s)</b> MOSKOWITZ ET AL.	
	<b>Examiner</b> Jacqueline Johanas	<b>Art Unit</b> 3733	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed 05/16/2018.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 2-24. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a) ☐ All    b) ☐ Some    \*c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

<b>Attachment(s)</b>	
1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____ 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material 4. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date _____	5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 7. <input type="checkbox"/> Other _____

/Jacqueline Johanas/ Primary Examiner, Art Unit 3733	
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Application/Control Number: 15/862,016  
Art Unit: 3733

Page 2

The present application is being examined under the pre-AIA first to invent provisions.

#### EXAMINER'S COMMENT

Amendments to the specification filed 05/16/2018 have been entered.

Amendment to the title filed 05/17/2018 changing the title to "SPINAL FUSION IMPLANT WITH CURVILINEAR NAIL-SCREWS" has been entered.

#### *Election/Restrictions*

Claim 2 is directed to an allowable product. Pursuant to the procedures set forth in MPEP § 821.04(B), claims 15-21, directed to the process of making or using an allowable product, previously withdrawn from consideration as a result of a restriction requirement, are hereby rejoined and fully examined for patentability under 37 CFR 1.104.

Because all claims previously withdrawn from consideration under 37 CFR 1.142 have been rejoined, **the restriction requirement as set forth in the Office action mailed on 02/21/2018 is hereby withdrawn.** In view of the withdrawal of the restriction requirement as to the rejoined inventions, applicant(s) are advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Once the restriction requirement is withdrawn, the

Application/Control Number: 15/862,016

Page 3

Art Unit: 3733

provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

### REASONS FOR ALLOWANCE

See examiner's statements in interview summary mailed 02/21/2018 for reasons for allowance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacqueline Johanas whose telephone number is (571)270-5085. The examiner can normally be reached on Monday to Friday, 9:00am to 5:00pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eduardo Robert can be reached on 571-272-4719. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

Application/Control Number: 15/862,016

Page 4

Art Unit: 3733

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacqueline Johanas/  
Primary Examiner, Art Unit 3733

EAST Search History

**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	88	(nathan near2 moskowitz).in.	US-PGPUB; USPAT; EPO	OR	ON	2018/06/07 19:06
L2	89	(mosheh near2 moskowitz).in.	US-PGPUB; USPAT; EPO	OR	ON	2018/06/07 19:06
L3	73	(ahmnon near2 moskowitz).in.	US-PGPUB; USPAT; EPO	OR	ON	2018/06/07 19:06
L4	8331	a61b17/7001-7046.cpc.	US-PGPUB; USPAT	OR	ON	2018/06/07 19:06
L5	287	a61b17/7056.cpc.	US-PGPUB; USPAT	OR	ON	2018/06/07 19:06
L6	677	a61b17/7053.cpc.	US-PGPUB; USPAT	OR	ON	2018/06/07 19:06
L7	4095	a61b17/8625,86.cpc.	US-PGPUB; USPAT	OR	ON	2018/06/07 19:06
L8	736	a61b2017/8655.cpc.	US-PGPUB; USPAT	OR	ON	2018/06/07 19:06
L9	12546	L4 L5 L6 L7 L8	US-PGPUB; USPAT	OR	ON	2018/06/07 19:06

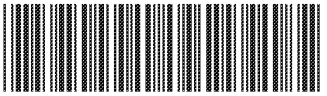
**EAST Search History (Interference)**

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6/7/2018 7:11:11 PM

C:\Users\jjohanas\Documents\EAST\Workspaces\15862016.wsp



<b>Search Notes</b> 	<b>Application/Control No.</b> 15862016	<b>Applicant(s)/Patent Under Reexamination</b> MOSKOWITZ ET AL.
	<b>Examiner</b> JACQUELINE JOHANAS	<b>Art Unit</b> 3733

CPC- SEARCHED		
Symbol	Date	Examiner
a61b17/7001-7046,7056,7053,8625,86	2/14/2018	JJ
a61b2017/8655	2/14/2018	JJ
above updated	6/7/2018	JJ

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

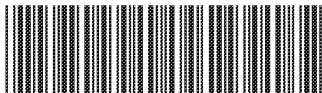
US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

\* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
EAST, inventor searches	2/14/2018	JJ
above updated	6/7/2018	JJ

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	PGPUB Database, see printout	6/7/2018	JJ

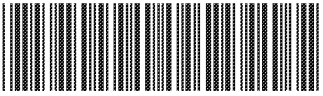
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<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  15862016	<b>Applicant(s)/Patent Under Reexamination</b>  MOSKOWITZ ET AL.
	<b>Examiner</b>  JACQUELINE JOHANAS	<b>Art Unit</b>  3733

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	02/14/2018	06/07/2018						
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16	24		=						



<b>Issue Classification</b> 	<b>Application/Control No.</b> 15862016	<b>Applicant(s)/Patent Under Reexamination</b> MOSKOWITZ ET AL.
	<b>Examiner</b> JACQUELINE JOHANAS	<b>Art Unit</b> 3733

CPC						
Symbol					Type	Version
A61B		17		0642	F	2013-01-01
A61F		2220		0025	A	2013-01-01
A61F		2		4455	A	2013-01-01
A61B		2017		0648	A	2013-01-01
A61B		2017		0647	A	2013-01-01
A61B		2017		0641	A	2013-01-01
A61B		17		8685	I	2013-01-01
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A61B		17		8605	I	2013-01-01
A61B		17		7023	I	2013-01-01
A61B		17		7011	I	2013-01-01
A61B		17		7004	I	2013-01-01
A61B		17		7001	I	2013-01-01
A61B		17		068	I	2013-01-01


CPC Combination Sets						
Symbol			Type	Set	Ranking	Version

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)		23	
(Date)			
/JACQUELINE JOHANAS/ Primary Examiner, Art Unit 3733	06/07/2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	2	8A

U.S. Patent and Trademark Office

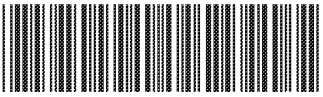
Part of Paper No. 20180607

 MOSKOWITZ-00000180  
**JTX-011.0180**

<b>Issue Classification</b>  	<b>Application/Control No.</b>  15862016	<b>Applicant(s)/Patent Under Reexamination</b>  MOSKOWITZ ET AL.
	<b>Examiner</b>  JACQUELINE JOHANAS	<b>Art Unit</b>  3733

[illegible]

NONE		Total Claims Allowed:	
		23	
(Assistant Examiner)	(Date)		
/JACQUELINE JOHANAS/ Primary Examiner.Art Unit 3733	06/07/2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	2	8A

<b>Issue Classification</b> 	<b>Application/Control No.</b> 15862016	<b>Applicant(s)/Patent Under Reexamination</b> MOSKOWITZ ET AL.
	<b>Examiner</b> JACQUELINE JOHANAS	<b>Art Unit</b> 3733

<input type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b>								<input type="checkbox"/> <b>CPA</b>		<input type="checkbox"/> <b>T.D.</b>		<input type="checkbox"/> <b>R.1.47</b>			
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NONE		<b>Total Claims Allowed:</b>	
		23	
(Assistant Examiner)	(Date)		
/JACQUELINE JOHANAS/ Primary Examiner, Art Unit 3733	06/07/2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	2	8A

U.S. Patent and Trademark Office

Part of Paper No. 20180607

 MOSKOWITZ-00000182  
**JTX-011.0182**

Attorney's Docket No.: 46440-0013002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor : Nathan C. Moskowitz      Art Unit : 3733  
Application No. : 15/862,016      Examiner : Jacqueline T. Johanas  
Filed : January 4, 2018      Confirmation No. : 6203  
Notice of Allowance Date: June 18, 2018  
  
Title : SPINAL FUSION IMPLANT WITH CURVILINEAR NAIL-SCREWS

**MAIL STOP ISSUE FEE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

REPLY TO NOTICE OF ALLOWANCE

In response to the Notice of Allowance dated June 18, 2018, enclosed is a completed Part B - Fee(s) Transmittal.

The issue fee is being paid with this reply on the Electronic Filing System. Apply those fees and any other necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: 6/20/2018

/Stuart A. Nelson/  
Stuart A. Nelson  
Reg. No. 63,947

Customer Number 26191  
Fish & Richardson P.C.  
Telephone: (612) 337-2538  
Facsimile: (877) 769-7945

61705673.doc

**PART B - FEE(S) TRANSMITTAL**

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26191 7590 06/18/2018

FISH & RICHARDSON P.C.  
P.O. BOX 1022  
MINNEAPOLIS, MN 55440-1022

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/862,016	01/04/2018	Nathan C. Moskowitz	46440-0013002	6203

TITLE OF INVENTION: SPINAL FUSION IMPLANT WITH CURVILINEAR NAIL-SCREWS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0		\$500	09/18/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
JOHANAS, JACQUELINE T.	3733	606-264000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

1 Fish & Richardson P.C.

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 \_\_\_\_\_

3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE  
Moskowitz Family LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY)  
Rockville, MD

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☒ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

☐ A check in the amount of the fee(s) is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number 06-1050.

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27.

☐ Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above. NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Stuart A. Nelson/

Date 6/20/2018

Typed or printed name Stuart A. Nelson

Registration No. 63,947

61705674.doc

MOSKOWITZ-00000184  
**JTX-011.0184**

Electronic Patent Application Fee Transmittal				
<b>Application Number:</b>		15862016		
<b>Filing Date:</b>		04-Jan-2018		
<b>Title of Invention:</b>		SPINAL FUSION IMPLANT WITH CUNVILINEAR NAIL-SCREWS		
<b>First Named Inventor/Applicant Name:</b>		Nathan C. Moskowitz		
<b>Filer:</b>		Stuart A. Nelson/Abby Remer		
<b>Attorney Docket Number:</b>		45335-0013002		
Filed as Small Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				500

<b>Electronic Acknowledgement Receipt</b>	
<b>EFS ID:</b>	32951236
<b>Application Number:</b>	15862016
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	6203
<b>Title of Invention:</b>	SPINAL FUSION IMPLANT WITH CUNVILINEAR NAIL-SCREWS
<b>First Named Inventor/Applicant Name:</b>	Nathan C. Moskowitz
<b>Customer Number:</b>	26191
<b>Filer:</b>	Stuart A. Nelson/Natalie Reynolds
<b>Filer Authorized By:</b>	Stuart A. Nelson
<b>Attorney Docket Number:</b>	45335-0013002
<b>Receipt Date:</b>	20-JUN-2018
<b>Filing Date:</b>	04-JAN-2018
<b>Time Stamp:</b>	14:47:43
<b>Application Type:</b>	Utility under 35 USC 111(a)

**Payment information:**

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 500
RAM confirmation Number	062118INTEFSW00001101061050
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	



**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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**Warnings:****Information:**

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**Warnings:****Information:**

<b>Total Files Size (in bytes):</b>	161337
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
 United States Patent and Trademark Office  
 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/862,016	01/04/2018	3733	730	45335-0013002	20	2

CONFIRMATION NO. 6203

CORRECTED FILING RECEIPT



000000010049880

26191

FISH &amp; RICHARDSON P.C. (TC)

PO BOX 1022

MINNEAPOLIS, MN 55440-1022

Date Mailed: 06/25/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Inventor(s)**

Nathan C. Moskowitz, Rockville, MD;  
 Mosheh T. Moskowitz, Rockville, MD;  
 Ahmnon D. Moskowitz, Rockville, MD;

**Applicant(s)**

Nathan C. Moskowitz, Rockville, MD;

**Power of Attorney:** The patent practitioners associated with Customer Number 26191

**Domestic Priority data as claimed by applicant**

This application is a CON of 12/957,776 12/01/2010 PAT 9888918  
 which is a CIP of 12/471,340 05/22/2009 PAT 8734516  
 which is a CIP of 12/054,335 03/24/2008 PAT 7972363  
 which is a CIP of 11/842,855 08/21/2007 PAT 7942903  
 which is a CIP of 11/536,815 09/29/2006 PAT 7846188  
 which is a CIP of 11/208,644 08/23/2005 PAT 7704279  
 and said 12/957,776 12/01/2010  
 claims benefit of 60/670,231 04/12/2005  
 and claims benefit of 61/265,752 12/01/2009

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**Permission to Access Application via Priority Document Exchange:** Yes

**Permission to Access Search Results:** Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 01/26/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/862,016**

**Projected Publication Date:** Not Applicable

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

SPINAL FUSION IMPLANT WITH CURVILINEAR NAIL-SCREWS

**Preliminary Class**

606

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative,

page 2 of 4

this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## **LICENSE FOR FOREIGN FILING UNDER**

### **Title 35, United States Code, Section 184**

### **Title 37, Code of Federal Regulations, 5.11 & 5.15**

#### **GRANTED**

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#### **NOT GRANTED**

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**ISSUE NOTIFICATION**

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**  
 (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

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